JUNE, 1954

Traffic Engineering

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- **Highway Development in the State of Texas**
- **Signalization Priority in Los Angeles County**
- **Parking Programs Stir Interest**

Official Publication of the Institute of Traffic Engineers

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Traffic Engineering

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COVER: Chicago Park District Underground Garage is approximately 50% completed. Right hand portion of cover shows completed stage one. Construction of the underground garage was started in January, 1953. First stage of construction calling for temporary relocation of Michigan Avenue and construction of the half of the garage under the Avenue was completed in November, 1953. The entire garage is expected to be completed in August, 1954. See Traffic News for further information on Chicago's parking program.

PURPOSE: Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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Frankly Speaking

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HAVE YOU EVER SEEN a monument erected to traffic safety? Frankly, I know of none. Monuments to safety and expeditious traffic movement are negative things—the accident that didn't happen, the delay that didn't occur, the person who was not killed. These are impersonal and not readily identifiable: Who are the *individuals* that escaped injury and death? Perhaps you or one of yours are an unrecognized living monument made possible through the efforts of others. How many other such living and unknown monuments exist because of your efforts? The answer, no one knows.

The results of traffic engineering do not of themselves demand recognition. A physical improvement may bring momentary acclaim, but it is soon accepted as commonplace or forgotten. Meanwhile, each point of congestion and each hazardous location cries aloud for a solution. They stand out as constant reminders of traffic failures. Their number will increase with the ever increasing flow of traffic unless positive action is accentuated.

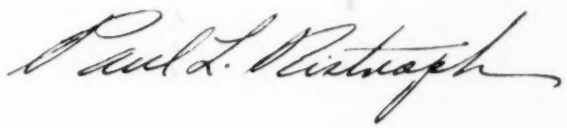
Responsibility for this positive action is shared by the Traffic Engineering profession. The profession, in all modesty, knows how to build safety and efficiency into our traffic facilities. We have a service potential and a "know how" that is urgently needed. However, I believe that the capabilities and potential of our profession are too little known to promote their full utilization.

As engineers, we are basically methodical and factual. For the most part, we work without fanfare and many of us tend to look upon public relations as just so much "ballyhoo." As professional men, we adhere to the "Canons of Ethics for Engineers" and do not advertise individual work or merit in a self-laudatory manner. Yet, under the same canons we cannot shirk our responsibility "to extend public knowledge of engineering." We must make known both our potential and willingness to serve if we would be of greater service to our fellow men. One method of accomplishing this is to share our traffic engineering knowledge with our teammates who are likewise attempting to achieve safer and more efficient traffic movement.

The first of these teammates is "the public." We are an integral part of that great body and as such it is our duty to work with and among them toward a common objective. Since this teamwork is dependent upon mutual understanding, a good public information program becomes a necessary part of our cooperative effort.

Further, as good team players, it is incumbent upon us to participate actively with other groups. Certainly, we have vital contributions to make in the design of traffic facilities; in providing efficient traffic control—not only for vehicles but for pedestrians also; in the planning of our communities; in assistance in the related fields of engineering and architecture; in education, enforcement and motor vehicle administration; and in the economic and sociological aspects of all of these interests. We likewise must be concerned with the capabilities and limitations of human beings as well as those of the vehicle and roadway. We must actively participate in these and all related fields of endeavor under the banner of Traffic Engineering if we are to advance our profession.

Only through such cooperative efforts, sustained by professional worth, can the Traffic Engineer continue to move forward toward his objective of service to his fellow man. Only in this way can he hope to minimize the undesirable monuments created by traffic inadequacies. Only in this way can he continue to increase the monuments to safe, convenient, economical movement of people and goods—monuments that mark the spots where lives were saved. To this cooperative end, I urge that we re-dedicate ourselves.



Director
District Number 5

Highway Development in the State of Texas

By D. C. Greer

Texas State Highway Engineer, Austin, Texas

Dewitt C. Greer

The following article was prepared from a lecture delivered by Mr. Greer at the Northern Technical Road Congress, Oslo, Norway, June 14th. See Traffic News section for further discussion about Mr. Greer.—EDITOR.

IN THE STATE OF TEXAS, we operate under State supervision the main road system, consisting of about 50,000 miles. This comprises the main arteries of the State including the city streets traversed by such arteries of traffic, as well as a rather extensive Secondary or Farm-to-Market Road System. Our revenues produce approximately $150 million per year for expenditure on this system of roads. Of this amount we expend approximately $110 million for construction and reconstruction each year, and approximately $40 million for maintenance, engineering and overhead operations. We handle the engineering, the construction and the maintenance of this system of roads with approximately ten thousand employees.

During the past ten years we have been able to devote a portion of our revenues to the construction of the modern controlled access expressway leading into and out of metropolitan centers, generally where traffic volumes in excess of 45,000 vehicles per day are involved. During this period of time we have been able to develop 60 miles of these expressways at an approximate cost of $1 million per mile. On these expressways we generally use right of way varying from 200 feet in width to 300 feet in width. We usually provide at least four lanes for through traffic and four lanes for local service traffic on the outer edge of the right of way. All opposing lanes are separated to prevent traffic friction.

It is, of course, not financially possible to construct all of the miles of that which is considered advisable from an engineering standpoint. It, therefore, becomes the duty of the engineer to find a way to assist the safe and free movement of traffic on existing facilities awaiting the time when finances may be available for the construction of the ideal type of engineering development. It is for this reason that I will devote a portion of this paper to the traffic engineering that might be utilized on existing facilities to assist in the smooth and safe movement of traffic.

Many of our streets and highways are of obsolete design and are inadequate to meet the demands of today's high volume, high speed traffic. This condition has created serious problems of traffic accidents and congestion. The ideal solution for these traffic problems would be to replace the inadequate streets and highways with traffic facilities having design features that automatically eliminate the basic causes of accidents and congestion and that compensate for human errors by making numerous hazardous driving acts impossible. The engineer, however, is faced with the reality that it is an economic impossibility to replace immediately the existing streets and highways with traffic facilities of ideal design, and he must, therefore, devote a large part of his time and effort to measures designed for making the most efficient use of existing streets and highways. Such measures must be inexpensive to fit limited budgets; they must provide immediate relief for accidents and congestion; and they must gain public acceptance. Fortunately, the engineer has been able to devise traffic engineering techniques that will meet these requirements in the form of traffic regulations, traffic control devices, and structural improvements at specific locations.

Traffic regulations which have proved their worth in relieving accidents and congestion are control of curb parking, one-way streets, turn prohibitions, speed zoning and marking curves with safe speed restrictions. Obviously, when more street space is needed for moving the ever increasing volume of traffic, the quickest and most economical way to provide such space is through the application of curb parking restrictions and prohibitions. In some locations, parking prohibitions at the curb are necessary only at peak traffic hours while at others they are necessary at all hours. The average 40-foot street with no parking in a downtown area can accommodate the same volume of traffic as the average 68-foot street on which parallel parking is permitted. This

FRONTISPIECE:
California's Golden Gate Bridge in San Francisco. Courtesy, Standard Oil Company, (New Jersey).

Three level grade separation at the entrance to the Baytown Tunnel.

is a reduction of 14 feet in the effective width of the 68-foot street for each line of parked vehicles. In the face of these facts, it is obvious that parking restrictions will continue to grow more stringent as congestion of traffic increases. It is obvious, of course, that removal of curb parking eliminates the accidents which occur between moving vehicles and those vehicles maneuvering in and out of parking spaces.

A well planned system of one-way streets will generally result in a reduction of both accidents and congestion. Such improvements can result primarily in the reduction of the 16 potential conflicts which exist at an intersection of two two-way streets to the five potential conflicts at an intersection of a one-way and a two-way street. Pedestrian safety is increased by the fact that a pedestrian has to look for approaching traffic in but one direction when crossing a one-way street. An actual case study of a one-way street system in one Texas city showed that the volume of traffic increased by as much as 50 per cent on some streets after they were converted to one-way traffic, and the speed of traffic on these streets increased as much as 14 to 38 per cent even with the increase in traffic volumes. Traffic delays also decreased, varying from 45 per cent on some streets to no delays on others in traveling through the business district. On narrow streets where additional traffic capacity is needed, it is often desirable to convert the streets to one-way traffic in lieu of removing parking from the curbs. Either with or without parking, one-way streets can be an effective weapon in attacking the traffic problem.

On heavily traveled streets which have only one lane for moving traffic in each direction, it often becomes necessary to prohibit turning movements at intersections to keep from blocking through traffic. If there is more than one lane for moving traffic in each direction, however, it is often desirable to designate one lane for turning movements rather than prohibiting turns. At some intersections, physical conditions are such that the intersection approach can be widened to provide a lane for right turn movements or in the case of a median island, a left turn lane might be provided by reducing the width of the island. Where it is practical to provide separate turning lanes, the traffic capacity of intersections at grade can be increased greatly.

As you know, there is a great imbalance between the speed at which a motorist can travel safely on many streets and highways and the speed of which a modern automobile is capable. More often than not it is impractical to raise the design speed of the street or highway to that of the automobile, and it then becomes necessary to regulate the speed of the motorist by legal restrictions. Speed limits that are reasonable and prudent will not only enhance the safety of motor vehicle operation, but they will increase the capacity of a roadway to carry traffic. Arbitrary speed limits that do not fit the existing conditions, however, have very little value. Another use of speed limits is that of posting advisory speeds for curves on rural highways at the highest value which the motorist can travel the curve safely and remain on his side of the road. The posted speed on curves has no legal status, but it does serve as a guide to help the motorist travel the curve safely.

A uniform system of traffic control devices which includes signs, signals, and markings is an immeasurable help in making better use of existing streets and highways if properly designed, properly installed, and properly maintained.

Where cross traffic cannot be separated by structures, it is often necessary to resort to traffic signals for assigning right-of-way first to one street and then to the other. There are, of course, other conditions which justify the use of traffic signals, all of which are predicated on the theory of expediting the safe movement of traffic.

Traffic signs are essential where special regulations such as speed limits and no parking regulations apply at specific places or at specific times only, or where hazards are not self-evident. They are also needed to give information as to highway routes, directions, destinations, and points of interest. Traffic signs are not needed, however, to confirm well-known or universally recognized rules of the road.

Pavement markings are very essential for marking parking spaces, crosswalks, stop lines, lane lines, center lines and no-passing zones at locations where overtaking and passing of vehicles is hazardous. These markings help to conserve street space, organize the flow of traffic, and promote safety.

For traffic control devices to be most effective their use must be based on factual studies, and the final choice of device to be used must take into consideration certain well recognized and proven principles. The State of Texas, like most other States of the United States, has prepared and adopted a Manual on Uniform Traffic Control Devices which conforms closely with national standards, and this Manual contains specifications for the proper use of such devices.

Traffic regulations and traffic control devices will not always provide the solution for traffic problems at specific locations or on some sections of streets and highways. It then becomes necessary to apply structural changes. Such structural changes might consist of widening existing streets or highways, resurfacing of rough or slippery pavements, widening of narrow bridges, stabilizing the shoulders of uncurbed rural highways, channelizing intersections to define the paths of travel and reduce indecision on the part of motorists, and insulation of through traffic lanes from parking areas at business establishments along highways in small communities. Pavement widening might be cited as an example of the merits of the structural changes. The widening of a rural highway pavement from 18 to 24 feet will increase the practical capacity of the highway from 30 to 51 per cent, depending on the proximity of obstructions to the pavement edges. The values of other structural changes which have been listed are just as impressive in their respective spheres of application as that of the pavement widening, and all of them have proved their worth.

The engineer need never accept or condone the attitude of a defeatist in his efforts to solve the traffic problem. Even though he cannot attain the ideal solution in every instance, he has ample opportunity to make better use of that which

he has by the application of proven traffic engineering techniques.

I believe you might be interested in our viewpoint as to the economic relations between feeder roads and expressways, since any governmental agency vested with the responsibility for the construction and maintenance of a road system will eventually deal with these two extremes of traffic facilities.

The American Association of State Highway Officials has defined an Expressway as "A Divided Arterial Highway for Through Traffic with Full or Partial Control of Access and Generally with Grade Separations at Intersections." An expressway may be rural or urban and designed to meet the needs of entering and departing traffic with such full or partial control of access as the traffic may justify. This factor introduces a wide margin in design and it follows that a wide margin in capital investment may result.

We are not so fortunate as to have a national definition for feeder roads. Strictly speaking all roads or highways including arterial highways are feeder roads to each other. The expressway must gather traffic from arterial highways or arterial streets to obtain a traffic load to justify its construction cost. The volume of traffic to be taken care of is directly related to both the cost and service it performs.

The long recognized principle of taking vehicles from their origin to the point where they wish to go is as valid in expressway construction as it is on all other types of highways. To get its traffic load an expressway must tap its sources of traffic and afford a saving to the traffic in vehicle operation cost and provide greater safety, convenience and personal comfort when compared to competitive routes. These requirements are applicable to both free and toll facilities. On free facilities it has been found on a national scale that safety, convenience and personal comfort outweigh time saving and vehicle operation cost to some extent, especially in the case of passenger vehicles. Traffic has been found to assign itself to free expressways in ratio to the trip time required by combination of roads making partial use of the expressway with routes using other facilities entirely. Roughly 50 per cent of the expressway trips occur when the travel time is equal. When there is a time saving, greater percentages use the expressway, but with time loss, substantial percentages use the expressway within reasonable limitation. The expressway use, therefore, is heavy between the limits of approximately 80 per cent indicating a time saving to approximately 25 per cent where time loss occurs. To be successful the expressway must channel the traffic, in volume, to itself and afford it greater operating safety and comfort.

Our legislation in 1944, officially introduced the term "Secondary or Feeder Roads" stating that the term meant roads in rural areas, rural mail routes and school bus routes and not on the Federal Aid System. In explanation, it should be stated that the Federal Aid System was then an outlined and largely developed system of highways originally proposed to the States as a percentage of the total road mileage in each State. In the broad sense, this law, placed under the above definition, all existing rural state highways as well as such land service roads as might be developed. The State of Texas had at that time some 10,000 miles of state highways of which a large percentage were through roads carrying traffic volumes comparable to that of Federal Aid System which were of an arterial highway nature. Some of the mileage, however, may have been considered as Feeder Roads under that definition. The more populous states had further developed their highway systems and had many miles of highways providing rather complete land service to the State. The term "Feeder Road" might, therefore, mean something different in Texas than in some other state. Generally, Texas interprets the Feeder Road as a Farm to Market Road affording land service and contributing to the welfare of the rural population and to the future development of rural areas. Texas had an unlimited demand for this type of road and to date has constructed some 24,000 miles of new roads of this class. These roads are largely of minimum design and carry relatively low traffic.

Gulf Freeway.

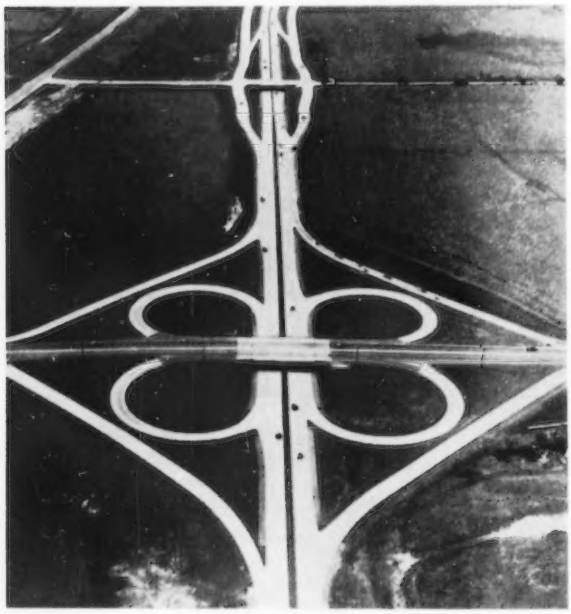
Since we are to compare the economic relation between expressways, which represent the highest class of highway yet developed, with feeder roads, which are of relatively low type, it would appear that the Texas Farm to Market Roads would provide the extremes for comparison.

From a design standpoint, the geometrics required to handle the estimated traffic volumes enter both multi-lane, divided highways, and two-lane highways. If it were possible to cut the cloth to fit the traffic volumes, it is conceivable that similar cost per vehicle mile of service could be made to result for all traffic volumes where other conditions were equal. Unfortunately, there is a minimum road regardless of traffic volume and that in the break from two-lane to four-lane divided roads there results an increase of approximately three times the traffic potential. These facts serve to throw traffic use costs out of balance in critical cases. Combining this with variations in cost due to physical conditions suggests the use of extensive samples and averages.

The word "economic" suggests cost. There is a similarity of cost of expressways and cost of feeder roads when

they are in balance between traffic potential and capital cost. Any highway accomplishment should be measured, in some degree, by the vehicle mile of service it affords. In the following examples I use the capital investment of actual working investment adjusted to dollars of a purchasing power of 1953 and you will note that I am using Texas experience and facts.

The Texas System of Highways, exclusive of Farm to Market Roads has an average capital investment of $50,516 per mile and carries an average traffic of 1,597 vehicles per day. The calculated result is 9 cents of capital investment per vehicle mile of service for one year of travel. This is a long established system and we, in Texas, are of the opinion that it is the result of well made expenditures and consider it as our gauge.



Dallas Expressway.

The Farm to Market System of roads in Texas has been constructed over a period of approximately 10 years. Forty-one per cent of these roads carry less than 200 vehicles per day and 17 per cent carry 500 or more vehicles per day. The average capital investment is $14,000 per mile and the average traffic is 391 vehicles per day. Each of these roads is two lanes in width and is paved and dustless. The calculated result is 10 cents of capital per vehicle mile of service for one year of travel.

At the present time Texas has 60 miles of completed urban expressways and 90 miles of completed rural expressways. Construction has been dependent on availability of current funds; hence, their construction has not been carried on as rapidly as could be expected with deficit financing. The result is that practically all of this mileage stands at a stage of construction where it has not been completely connected to obtain its potential traffic. We do have a section from Houston to Galveston which may be considered as now serving a large portion of the potential for which it was designed. We realize that this is an inadequate sample but it will illustrate our point. In this instance, 30 miles of rural expressway with an average capital investment of $321,000 per mile carries an average of 8,200 vehicles per day. The calculated result is 11 cents of capital investment per vehicle mile of service for one year. 6.8 miles of this expressway are within the City of Houston and it is constructed to full freeway standards. The average capital investment of this section is $2 million per mile and it carries an average of 44,470 vehicles per day. The calculated result is 12 cents of capital investment per vehicle mile of service for one year of travel.

I have recently noticed figures concerning expressway cost in Los Angeles, California. A section of expressway in Los Angeles of less than 2 miles in length interchanging other expressways cost $6 million per mile and carries 115,000 vehicles per day. This calculates as 14 cents of capital investment per vehicle mile of service for one year. 16.57 miles of completed expressway in Los Angeles cost an average of $2.5 million per mile and carries 42,770 vehicles per day. This calculates as 16 cents of capital investment per vehicle mile of service for one year of travel.

The above examples serve to convince us that Texas is operating close to established cost when measured in service and there is little difference between such cost regardless of the type of highway. The Los Angeles figures are indicative of a like result.

There are other factors entering the economy of both expressways and feeder roads. Expressways influence adjacent land values. Better access to downtown areas will preserve the tax values of the core areas of the cities by overcoming the movement of business to areas where less congestion exists and property values are lower. An economic survey made in Houston, Texas, in 1950 proved conclusively that lands bordering the expressway increased in value exceeding the increase in similar property served only by the usual pattern or of arterial streets. The rural expressway assures adequate highway service for a period of years and from observation, has encouraged the location of many heavy industries within their area of influence.

The developing Farm to Market Road System in Texas is showing results in increasing culture advantages to the people, improvement of adjacent properties and development of adjacent lands. This is based on observation and the increase in traffic usage which has occurred bears it out. School facilities for farm families are greatly improved and consolidation of schools is growing by reason of all weather roads.

These previously outlined economic factors pertaining to both expressways and feeder roads would be difficult to measure in monetary value but similarly contribute to the economic justification of the construction.

I have attempted to show that there is much evidence that the economy of roads at one extreme represented by Expressways and the other extreme represented by Farm to Market Roads have much in common. Our concepts of highway construction have required little modification. Our engineers have simply acquired a lesson in advanced design to produce highway facilities of traffic capacities beyond our thoughts of past years.

It has been our thinking that in highway administration we must apply the principles of traffic engineering and highway economics to our road systems, along with any skill that we may have in the actual designing of our roads and the control of the materials that go to make up the road and bridge structures.

Signalization Priority in Los Angeles County

By Harry Parker (Assoc. Mem., ITE)
Traffic Design Engineer, Los Angeles County Road Department, Los Angeles, California

and Richard M. Bartle (Jun. Mem., ITE)*
Municipal Financial Consultant, Stone & Youngberg, San Francisco, California

WITH MORE THAN four million inhabitants, Los Angeles County has more than two million registered vehicles. The County Road Department under Commissioner Sam R. Kennedy is charged with the design, construction, and maintenance of highways, bridges, and traffic control devices in unincorporated County territory. The Department maintains more than 4000 miles of primary highways with approximately three hundred signalized intersections.

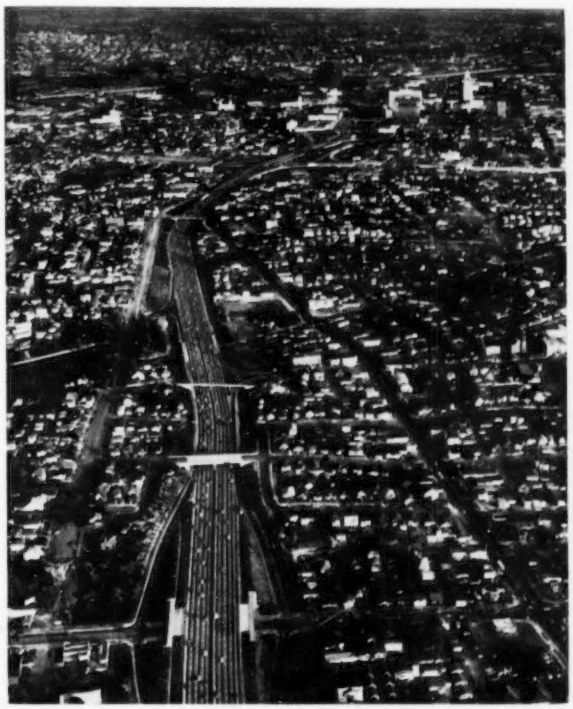
The rapid and continuing increase in traffic since World War II results in an ever greater need for traffic signals in County territory. In recent years about fifty traffic signal installations have been made per year, but an even greater number of additional intersections have probably qualified for signalization during this period under nationally recognized warrants.

New highway construction frequently requires the installation of traffic signals prior to opening the new facility to traffic. Other potential signal locations are disclosed by the Road Department's continuous program of accident analysis and traffic volume counts. Community groups and individuals submit many requests for installation of traffic signals at specific intersections. Although the County has an annual signal construction budget of $500,000, the number of installations is limited by availability of personnel. The need is apparent for an objective and easily applied method of determining whether the installation of traffic signals is warranted at any given intersection and, if so, whether this installation should be given priority over another intersection under consideration. The Road Department investigates every complaint and request it receives; therefore, all signal requests are studied. In the course of preliminary study it often becomes apparent that a request for signals reflects only lack of public understanding of the purposes and limitations of traffic signals. A large percentage of these requests are thus found to be unwarranted at an early stage of the investigation.

Many intersections in the County meet signal warrants and have not yet been signalized. Those intersections most in need of signalization *must* get first attention. The County cannot afford to make *any* unwarranted installations. It is unnecessary to elaborate here on the very bad effect on the public of an obviously unwarranted signal installation.

Prior to the development of the system described here, the judgment of the traffic engineering staff was the determining factor in deciding priority of signal installation. Guides such as the *Manual of Uniform Traffic Control Devices*[1] were of course, available and were utilized. The Manual, however, makes no attempt to weigh the relative effects of various warrants such as volume, accidents, interruption of through traffic, etc. It cannot, therefore, provide a yardstick for determination of priority of installation among several locations where signalization is found warranted.

Strict application of the Manual's volume warrant in Los Angeles County would permit signalization of far more intersections than the Road Department budget could afford and would provide for signals at a number of intersections where the Department's engineers believe them unnecessary.



Courtesy, California Highways and Public Works
Hollywood Freeway, Los Angeles County, California.

Even with established warrants to assist him, the Traffic Engineer must in the last analysis accept responsibility for the decision whether or not to signalize. No priority rating system should or could be used as a substitute for sound engineering judgment.

In the promulgation of a priority rating system for Los Angeles County, the aim was to develop an objective method which could be applied easily using factual data. The County wanted a system which would enable the Traffic Engineer to

*Mr. Bartle co-authored this article while working on a research project for the County of Los Angeles.—EDITOR.

make consistent judgments as to whether signals are warranted and to determine priorities among intersections he believes should be signalized. The Traffic Engineer would then have a sound, consistent, and objective basis for dealing with signal requests.

The best known and most widely used traffic signal priority system is the so-called Detroit system. This system, based on warrants established in the *Manual of Uniform Traffic Control Devices*[1] was developed in the City of Detroit and is summarized in the *Traffic Engineers' Technical Notebook*.[2] A modification of this system by F. Houston Wynn of the Yale Bureau of Highway Traffic was published as a nomograph in Traffic Engineering.[3] The Traffic Section of the Los Angeles County Road Department decided to evaluate the modified Detroit system as presented by Wynn, compare its results with existing County signalization practice, and apply such additional modifications as appeared desirable.

COUNTY OF LOS ANGELES
ROAD DEPARTMENT
TRAFFIC & LIGHTING DIVISION

Date:_____
By:_____

SIGNALIZATION PRIORITY WORK SHEET

For the intersection of _____ (main street) and _____ (side street).
(ADT in thousands:_____ = V) (ADT in thousands:_____ = S)

FACTOR	COMPUTATIONS	POINT SCORE
Volume	Use V, total ADT entering the intersection, and S from side street. Refer to volume table below for point score.	
Accidents	Point score = 10 x average annual number of accidents correctible by signalization.	
Pedestrians	P, pedestrian ADT in thousands crossing main street, = _____. V^2 P= pedestrian factor. Ped.Fact.: 20 25 30 35 40 45 50 60 70 80 90 100 125 150 175 200 300 Points : 0 10 17 23 28 32 36 42 48 53 57 61 69 76 81 86 100	
Through street	Main street distance(in thousands of feet) to nearest signal x V^2, = distance factor. Dist.Fact.:100 150 200 250 300 350 400 500 600 700 800 900 1000 2000 Points : 7 15 22 28 32 35 38 43 47 51 54 57 59 75	
Approach Speed	Speed (in mph): 25 30 35 40 45 50 Points: 0 10 20 35 50 75	
Coordination	New signal between 2 existing signals 2 cycles apart: 50 points " " " " 1 cycle apart : 20 points " " ½ cycle or 1 cycle from 1 existing signal: 20 points " " 1/3 off from ½ cycle distance : -20 points " " ½ off from ½ cycle distance : -50 points	
Four-way stop	If now a 4-way stop, compute T($\frac{V}{S}$ + 1)	
Miscellaneous	T-intersection or Y: -50 points Railroad crossing : 30 points Divided highway : -1/3 of volume score Other factors (list):	
	TOTAL POINT SCORE FOR INTERSECTION:	

VOLUME TABLE

"S", ADT ENTERING THE INTERSECTION (IN THOUSANDS)

PERCENT OF TRAFFIC ENTERING FROM SIDE STREET	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
5%	2	2	3	4	5	6	8	10	12	15	18	21	24	27	30	33	38	43	48	53	58
10%	4	6	8	10	12	15	18	22	26	30	34	41	48	55	62	70	77	84	92	100	108
15%	10	13	20	25	31	37	45	53	62	71	80	93	106	119	132	145	164	179	195	214	232
20%	16	24	33	42	51	60	76	92	108	124	140	160	180	200	220	240	269	298	327	356	385
25%	23	30	41	51	62	72	90	107	125	142	160	184	208	232	256	280	314	348	382	416	450
30%	43	37	49	61	73	85	106	123	144	161	180	208	236	264	292	320	359	398	437	476	515
35%	27	39	51	63	75	87	108	128	148	169	188	219	249	278	308	338	379	420	461	502	543
40%	29	41	53	65	77	89	111	132	154	176	196	229	261	294	326	355	398	443	484	527	570
45%	31	43	55	67	79	91	114	137	160	183	206	240	273	306	340	373	418	463	508	553	598
50%	32	44	56	68	80	93	117	141	165	190	215	250	285	320	355	390	437	484	531	578	625

Fig. 1.

As employed in Los Angeles County for an intersection under study, the modified Detroit system determines a numerical point score based on volume (vehicle and pedestrian), accident history, location with respect to other signals, approach speed, and some miscellaneous factors.

The method used by the County to compute priority ratings is presented in detail in Figure 1.

Volume data must be reliable; other information can be based on reasonable estimates. Detailed searches of accident records are not required; right angle collisions and pedestrian accidents at the intersection not involving turns are assumed correctible by signalization. A general knowledge of the area will usually permit reasonably accurate estimates of approach speeds. Distances can be scaled from available maps.

Point scores are determined from the intersection data according to the method outlined in Figure 1. When point scores have been assigned for each of the factors listed, these points are added algebraically to determine an overall point rating for the intersection.

Points for distance and coordination will be affected by proposed signalization of other intersections in the vicinity. In these cases, separate computations should be made assuming nearby signals are and are not installed.

In assigning points for coordination, distance between two existing signals is considered only if the location under study is between them. Where an intersection is not between two signals but is well located for coordination with a single existing signal, points may be allowed. In the latter case, 20 points are given if the nearest signal is one-half or one cycle distant.

Valley Boulevard and Hacienda Boulevard.

Semi-traffic actuated signals are in place at this intersection which is complicated by the presence of a Southern Pacific main line track diagonally across it. Traffic signals, railroad warning flashers, automatic crossing gates and an experimental installation of oscillating warning lights (visible on median in center of picture) are synchronized with train movements.

Editor's Note: In the above photo please note the back plates to the signals. The plates are used in conjunction with signal installations on most arms and far right, on primary installations. They are made of .058 inch aluminum sheet painted flat black and form an 8-inch frame around the signal heads. Plates are used to provide additional visibility, particularly where there are other lights or advertising signs which might decrease signal visibility.—Editor.

Points are subtracted if the intersection under study is at a poor timing point for progressive movement. In general, ½ cycle is considered as ¼ mile. Fifty points are subtracted if the intersection is 660 feet from the half-cycle point, and 20 points are subtracted if it is 440 feet from this timing point. Interpolation between these values is permitted.

Several adjustments were necessary in the original Detroit system to obtain consistency with existing County signalization policy. Because the County does not favor 4-way stop control on major streets, points were added where 4-way stops were in effect. "T" or 3-phase intersections had 50 points subtracted, and thirty points were added for railroad grade crossings. One-third of the volume score was subtracted for divided roadways.

Wynn presented the system as a nomograph, but the authors believe that tabular presentation is preferable. The basis for the point ratings is obscured by the nomograph, which also is more difficult to use than a table.

Two exceptions to Wynn's method were made after preliminary study. Where logarithmic equations were used to determine points to be assigned (pedestrians and distance to nearest signal), the authors used curves without changes in the equations. Wynn made changes in slopes, and the authors could find no basis for his doing so. Further, some different values were assigned and different items considered under "miscellaneous factors."

To examine the effect of the modified Detroit system and

to compare it with existing County practices, the following testing procedures were used:

Sixty-two County intersections for which reliable traffic data were available were selected. Each of these was rated according to the locally modified Detroit system. Each intersection was also rated by eight engineers on the Traffic Section staff who assigned each intersection a score between −3 and +3. Plus scores indicated the relative importance of signalization where it was desirable; minus scores were assigned where signals were unwarranted or undesirable. The composite score thus assigned by the engineers was the "judgment rating" for that intersection. The engineers who contributed to the judgment ratings were those who customarily determined whether or not an intersection was to be signalized.

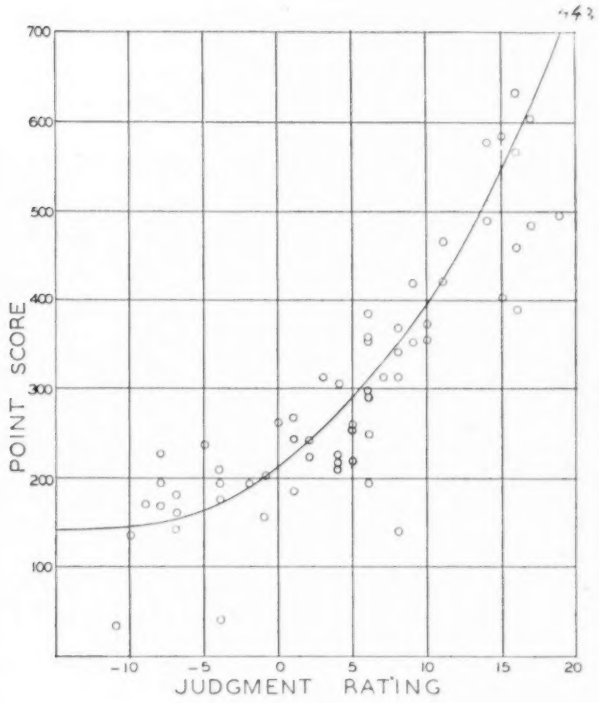


Figure 2

Comparisons of point score rating with rating by collective judgment.

On judgment scale scores over 8 unanimously warrant signals. A majority favors signals for those between 4 and 8. Minus scores do not warrant signals.

Intersections which scored +8 or over on the judgment scale unanimously warrant signalization in the opinion of Traffic Section engineers. Those with +4 have a majority in favor of signals. All intersections with minus scores in the judgment rating do not warrant signals.

Comparison of the priority rating scores and the judgment ratings is shown graphically in Figure 2. Scatter of the points away from the curve indicates comparative lack of agreement between the two systems.

A second test was made by selecting ten of these intersections and asking the same eight engineers to rank them in the order in which their signalization was believed necessary. These ten intersections were also scored according to the locally modified Detroit system. The results of this second test are summarized in Table 1.

A series of different weightings for different factors was tried in an effort to reduce the scatter of points in Figure 2. The point scale presented in Figure 1 produced the most consistent results. Miscellaneous factors such as 4-way stops and grade crossings were evaluated in such a way as to reduce the scattering of points. These factors will probably require individual weighting wherever such a system is to be used if the resultant system is to agree with local signal policy.

TABLE 1. Priority Ranking for Signalization for 10 Intersections Rated by Modified Detroit System and Collective Judgment

Intersection	Rating Points	
	Detroit	Judgment*
Alameda-Carson	725	76
Peck-Ramona	634	64
Narbonne-Lomita	459	57
Clark-Del Amo	423	43
Imperial-Downey	390	55
Aviation-El Segundo	374	45
New York-Allen	259	27
Florence-Old River	248	34
Vermont-Sepulveda	224	19
Bellflower-Arbor	220	20

La Brea Avenue, Stocker Street and Overhill Drive.

Full traffic-actuated 3-phase signals with leading green interval on one phase.

Cost of the installation, including highway safety lighting, was $27,000. Traffic volumes on the 5 approaches amount to nearly 5,000 vehicles per hour during peaks. Channelization was designed with the signal installation. A total of 33 warning, regulatory and guide signs are in place at the intersection and on its approaches.

An analysis of the results of these two tests indicates that with certain modifications for local conditions, good agreement between the Detroit system and the judgment ratings was achieved. Agreement between the rating system and the engineer's judgment appeared close enough to warrant official adoption of this modified Detroit system by the Los Angeles County Board of Supervisors on recommendation of the Road Department.

There are several important advantages and great potentialities of the point rating system as adapted here. The system is particularly effective in classifying intersections into broad categories according to need for signalization. Generally, an intersection scoring above 300 points has a definite

*Eight engineers ranked these intersections 1 to 10 in order of signalization priority. Ten points were assigned for 1st, 9 for 2nd, 8 for 3rd, etc. Maximum possible score is 80 and the minimum is 10.

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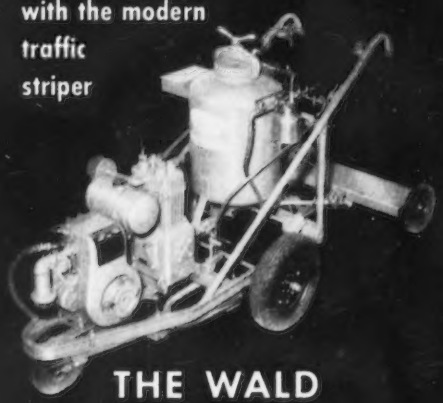

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signal warrant; a score below 200 indicates definitely that it has not. Intersections scoring between 200 and 300 points deserve further study, and whether or not to signalize in this range will depend primarily on the number of unsignalized intersections with scores of 300 or more. Since the Road Department is seldom required to make priority decisions between two intersections falling very close together on the rating scale, this classification is adequate for most needs. The main questions the system helps to answer are these two:

1. Is signalization warranted at a specific intersection being studied? It appears that the priority rating system can answer this question with consistency and objectivity. The various factors are weighed mathematically and given the same relative importance in each study.

2. Among several intersections with signals warranted, which should be given highest priority? The rating system seems capable of assigning such priority. Certain exceptions must, of course, be permitted in priority assignments. Where several intersections on one street are being signalized, for instance, priorities are of less importance since costs are reduced if all are signalized under one contract.

La Cienega Boulevard and Stocker Street.
Three phase full traffic-actuated signals with highway safety lighting. La Cienega Boulevard, a divided highway, carries very fast and heavy traffic through the oil fields in Southwest Los Angeles. The signals and channelization provide for free right turning movements at all times and continuous movement on La Cienega Boulevard from left to right in the photograph. All cross conflicts are controlled by the signals.

Los Angeles County has found that this priority rating system helps to put annual signal budgeting on a sound basis since it is possible to identify those intersections most in need of signals. The system has also proved helpful in dealing with requests from the public. The average citizen is more readily persuaded by presentation of numerical scores than by statements of engineering judgment. Thus the Traffic Engineer is able to present data on comparative need in support of a decision to postpone or disapprove signalization at a location proposed by interested groups or individuals.

Development of priority ratings for signalization appears to represent an important step in the transition of traffic engineering from an art to a science. It is urged that consideration be given to their widespread adoption. The experience of Los Angeles County may be helpful to others confronted with the complex problems of determining signal warrants and assigning priorities among intersections.

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[1]Manual of Uniform Traffic Control Devices for Streets and Highways.
[2]Traffic Engineer's Technical Notebook.
[3]Traffic Engineering, August 1951.

PARKING PROGRAMS STIR INTEREST

By the Editorial Staff

Arguments for and against the various basic methods for acquiring and operating off-street parking facilities were summarized by Sacramento, Calif., City Traffic Engineer D. Jackson Faustman as city officials and merchant groups there recently joined in launching a study aimed at developing the basis for "a long-range, cooperative off-street parking program in which both the city and private enterprise can each assume certain responsibilities."

Noting that Sacramento provided the nucleus for municipal participation in such a program through a 1951 revenue bond issue of $1,600,000 which already has financed several parking projects, Faustman emphasized:

"The problem of parking in a central business district is not unique to Sacramento but exists in practically every city in the country regardless of size. There have been a number of approaches and methods of solution both by municipal governments and private enterprise or a combination of the two. There probably is no one formula for action suitable to all cities . . ."

The Sacramento traffic engineer's summary of the pro and con views on the various approaches and methods being used to attack the problem were made public through the press there as follows:

Operation by municipality — arguments in favor: Parking generally at low cost or without charge; facilities can be located properly as part of a master parking plan; facilities are for use of the public at large; private enterprise has failed to provide adequate parking.

Also, metered parking at the curb places the city in the parking business; continuity and perpetuity of operation assured; when curb space is prohibited, off-street spaces should be provided by the municipality; and, a large part of the tax base is in the central business district—when this tax base diminishes because of lack of parking space, the municipality should protect itself by providing such space.

Arguments against operation by municipality: It is unfair to put the municipality in competition with private capital having large amounts invested in parking facilities; and, if a municipality shows it is not going to provide parking, private enterprise will be encouraged to do so.

Operation by merchants—arguments in favor: Retail trade is dependent upon parking and merchants should thus provide space for their patrons; no land is taken from the tax rolls; the merchants and parkers who are benefited pay the cost and there is no burden upon public funds; usually a cheap way to get customers into retail facilities; and, generally lower cost parking than commercial facilities since profits from parking are secondary to increasing sales.

Arguments against operation by merchants: Facilities are for shoppers only and not the general public; facilities are not provided in accordance with a master plan; unless minimum purchase system is used, merchants may actually lose money on small sales if a parking ticket is validated thereon.

Also, many stores are not large enough to provide parking and if groups are formed, additional members may be barred in order to maintain competitive advantages; retail establishments do not create entire parking problems, and merchants should not be required to provide more than a fair share of the required facilities; and, the success of the central business district is of community-wide interest as well as merchant interest.

Strictly commercial operation—arguments in favor: Private enterprise is the traditional American way of doing business; parking lots can be provided rapidly and in some cases may be the only profitable use of vacant land; land is not taken off the tax rolls; and, parkers pay all costs with no drain on public funds.

Arguments against commercial operation: Parking lots are often established only on a temporary basis on vacant lots; parking fees are high because of high rents, taxes, operating expenses and need for profits; lots are located only in those areas where immediate profits are possible; lots are often carelessly operated, poorly improved and unsightly; and, many operators are financially irresponsible.

Other current and prospective developments with respect to the financing and construction of additional off-street parking facilities, as reported from state capitals and municipalities throughout the country, on a state-by-state basis, include the following:

CALIFORNIA: A citizens' advisory committee in the city of Stockton approved a report calling for use of parking meter funds to help finance a public off-street parking program. The report also called for an immediate start of the program and advocated encouragement of developers of private parking facilities.

Use of the meter funds has been a sore point between city officials and downtown merchants. Merchants claim the money was promised to parking projects long before it was allocated to the city's 10-year capital improvement program, in which parking is not included.

COLORADO: Denver called for bids by May 11 for construction of the city's third off-street parking structure, to be located at 1625 Tremont Place. Specifications call for construction of an eight-story reinforced concrete building. Bid call does not include furnishing and installation of two directional elevators to move cars.

Estimated cost of the structure is $736,000. Earlier this year, the city rejected bids on building two structures, contending that the bids were too high. Originally it was planned to build two five-story open-deck structures, with the other to have been located east of the Denver Athletic Club. A parking lot will be located there instead.

The new facility will park 400 cars. Two previous parking buildings opened by the city each are 10 stories high.

Meanwhile, it was announced that Denver's present municipal parking garages and lots are making more money than engineers said they would. City Improvements and Parks Manager T. P. Campbell said the total net profits of the two off-street parking garages and the two surface lots recently opened has amounted to $9,529. This profit has been placed in a special fund for the re-

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tirement of bonds issued to launch the city's off-street parking program.

The parking facilities were put into operation after the New York engineering firm of Coverdale & Colpitts said the lots and garages would be "economically feasible." Campbell said profits from the project so far are much greater than anticipated.

The garage at 1425 Champa St., opened Feb. 15, has taken in $2,776 and spent $7,734 for a loss of $4,958. Campbell said this loss was expected. As soon as the public becomes familiar with the garage's location it, too, will start making money, he declared.

Financial breakdown of the other three facilities shows: Garage No. 1 at 1745 Stout St., opened Jan. 15, income $18,138, expenses $15,172, profit $2,966; surface lot No. 1 at 1825 Welton St., opened May, 1953, income $24,671, expenses $15,515, profit $9,156, and surface lot No. 2 at 1435 Larimer St., opened December, 1953, income $8,661, expenses $6,296, profit $2,365.

CONNECTICUT: Construction of a 1,050-space municipal off-street parking garage on Church St., Hartford, was started early in April by B. Perini and Sons of Framingham, Mass. The firm said it "hopes to run far ahead of the construction schedule set by the city and to have at least 450 car spaces ready by Dec. 1." One requirement of the contract is that 450 spaces be available for use during the 1954 Christmas shopping season. The Perini firm said that it will try to complete the entire program by then.

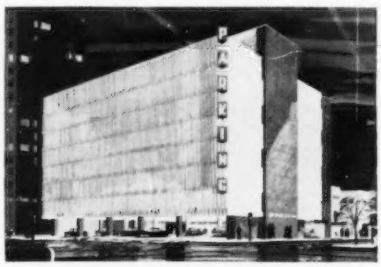
The building will be constructed under a bond issue totaling $2,940,000, of which about $600,000 already has been expended to acquire land for the facility.

FLORIDA: Plans for a private-enterprise, multi-level parking garage in Jacksonville, which will be the first of its kind in the city, were announced early in April by C. W. Hawkins, executive vice-president of the Model Land Co. of St. Augustine. Hawkins said the company, a Flagler enterprise, will invest about $1,000,000 in the project, including the cost of the site.

The company has purchased the first of five parcels of property and has sale contracts on the other four. Last purchase will be closed in August.

As each parcel is acquired, the company will remove buildings and pave each area for immediate use as a parking lot. Eventually all five areas will become one large parking lot. Construction of the multi-level garage will begin in about a year.

Hawkins said the garage will be comparable to the Ingraham Parking Garage which the Model Land Co. owns and operates in Miami. This structure, completed in 1948, has five parking levels with a total capacity of more than 630 cars. An additional floor for another 125 cars will be built soon.



The garage has elevators for customers. Cars are taken up and down via two spiral ramps. The structure is completely enclosed to guard vehicles against hurricanes.

The Jacksonville garage will have parapet walls, running most of the way up from each floor but with openings in place of windows. This arrangement will provide protection from the weather and ventilate the building at the same time. Hawkins noted that there is no need for a hurricane-proof building like that in Miami because Jacksonville is out of normal hurricane belt.

The Model Land Co. owns property in Duval County but this is its first acquisition in the City of Jacksonville. Hawkins said the company's decision was prompted not only by the need for more off-street parking but also by the firm's "faith in the future of Jacksonville."

INDIANA: A unique parking plan in cooperation with the city to save what they termed the oldest neighborhood business section in Indianapolis was proposed early in April by Fountain Square businessmen.

Seeking to protect their investments, they petitioned Mayor Clark and the Board of Public Works to back their plan for establishing 200 off-street parking spaces. Cost of the project was estimated at $200,000.

The proposed plan called for acquisition of half a city block of property between Shelby and Olive Sts. along Woodlawn Ave., removal of existing residences and building of a community parking lot. City purchase and operation of the property with parking me-

ters and private financing through revenue bonds was urged.

The Fountain Square Businessmen's Association favored the plan as the only means to protect their businesses in the present swing toward suburban business developments. The lack of parking facilities was held to be killing several neighborhood business sections in other cities throughout the nation.

The plan calls for the works board to float revenue bonds to finance the project and to install parking meters. Merchants would purchase the bonds, which would be paid off from the parking meter revenue. Cost of the $200,000 project, which would cover 11 city lots on the proposed site, would be paid off in 20 years.

KANSAS: A test suit challenging the validity of Topeka's $2,000,000 Park and Shop Program of providing off-street parking in the city's downtown business section was taken under advisement by the State Supreme Court after hearing oral arguments. A decision was expected in May.

Lester Goodell, Topeka attorney, attacked the constitutionality of the state law under which the City of Topeka set up the parking program and challenged a contract to lease the property to Park and Shop, which he termed a private group. City Attorney Fred Carman maintained the state law met all constitutional points, and R. L. Webb, special counsel, upheld the contract.

An original proceeding in quo warranto, the suit asks by what right the city is acting in providing the parking lots and a ramp type garage. The suit arose through a property-owner's challenge of the city's right to condemn property for this purpose, then lease the parking areas to a private corporation, Park and Shop, which was formed by 39 incorporators, mostly Topeka businessmen, to relieve parking conditions in the downtown area, after a survey which showed a deficiency of some 1,800 parking spaces.

The suit is based on W. K. Thompson's land on Quincy, which would be converted into a surface parking lot. A ramp-style, three-story parking garage would be located at Seventh and Jackson.

In his brief, Goodell said "this action involves a statute of state-wide application, affecting all cities of the first class in the state.

"It involves large expenditures of funds, right of municipalities to engage in this enterprise and to take private property by condemnation. It involves the right of the cities to make lease contracts for the operating of parking facilities with private persons, and the carrying on of all business incident thereto. Because of these matters, this case involves questions of great public interest and concern."

Goodell argued that the state law illegally delegates legislative powers to the city and takes private property for a use other than for the public. He also contended that the contract for leasing the property to Park and Shop is "in excess of its municipal powers."

He said "the contract for a lease already provides for and will permit a diversion of the parking lots in furtherance of the private businesses of the stockholders of Park and Shop, and unlawfully discriminates against the public."

Maintaining that the parking garage, under its lease could compete with private business in selling gasoline and tires, Goodell said "this lease is the most astounding thing you ever saw because of its provisions."

Questioning Goodell, Justice William Wertz said: "Why go into all this about the lease. If the law is unconstitutional all that will be thrown out. If it isn't, this court doesn't have to go into all that the city does about the lease."

Carman and Webb argued that everything the city and Park and Shop have done has been according to the law passed by the Kansas state legislature.

Carman said "courts over the land have held that off-street parking is a public use and within the police power of a city. We believe this court will take notice of the extreme need for off-street parking facilities in our first class cities. All procedure the city has taken under this statute has been proper."

He added that "local discretionary powers" relative to parking lots are "properly delegated to the cities" in the act.

When Wertz interjected, "Is it not a subterfuge for the city to condemn property and at the same time lease this property to a private corporation?" Car-

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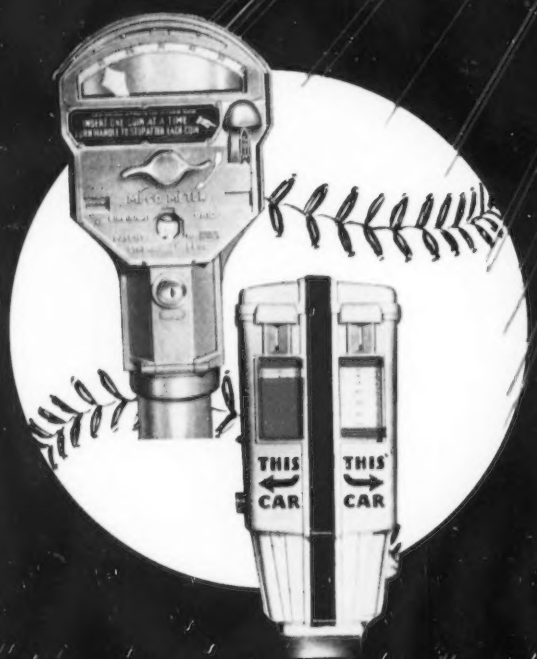

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Division of the Michaels Art Bronze Co., Inc.

man replied "We believe off-street parking is a public use."

Carman also said the law limits the facilities to off-street parking and "of course a grant can't be made for selling tires and gasoline."

Webb argued that the contract for the lease is valid. He traced the development of the parking plan, with the city and the merchants both working to get more parking areas. Then the two began working together, Webb said, under the plan being challenged.

He said "this contract that Mr. Goodell talks about is nothing but an outline for a future lease which will have many binding provisions."

The city's brief concluded: "The problem of traffic congestion is not new. It was first recognized in Rex versus Cross in 1128 in which Lord Ellenborough stated that 'the King's highway is not to be used as a stableyard.' However, the partial solution of the problem by means of municipal off-street parking facilities is rather new. During the past few years there has been a great amount of litigation concerning such facilities. Every conceivable attack has, we believe, been made.

"An overwhelming majority of the cases have supported the validity of the statutes ordinances and procedures followed concerning municipal off-street parking facilities and problems related thereto. We have attempted, by this brief, to use a few late cases to answer the arguments of the plaintiff.

MARYLAND: Belief that Baltimore's off-street parking program is "the soundest, most economical plan" for the city was expressed by the Baltimore Parking Operators' Association in a letter to Mayor D'Alesandro.

The program, which provides for city loans to private companies of up to 85 per cent of the money needed to build multi-storied parking structures, was suspended by the mayor to permit his administration to decide whether it has served its purpose. It was started in 1949 and has resulted in the construction of some 19 garages, with a total capacity of more than 4,000 cars and costing more than $7,000,000.

"Although we admit that improvements in the program can be made," Solomon Liss, association executive secretary wrote the mayor, "we are aware of the substantial achievements of the plan. We know of no means whereby the same result could have been achieved as expeditiously or as economically.

"The association has therefore asked me to place our association on record as being opposed to the abandonment of the off-street parking plan, and before it is abandoned we trust that ample opportunity will be presented for public hearing and determination . . ."

MISSOURI: Construction of Kansas City's underground garage and plaza in the block north of the Municipal Auditorium was started in March. When completed, the three-level facility will provide space for 1,200 cars. Construction cost is esimated at $3,238,000. Funds came from sale of a $4,100,000 revenue bond issue.

NEBRASKA: A group of Omaha businessmen incorporated the Omaha Downtown Parking Association, with an authorized capital of $3,000,000 to build, operate or lease parking facilities or allied enterprises and take other steps to further the solution of parking and traffic problems.

NEW JERSEY: Ramp Buildings Corp., of New York, was awarded a $15,000 contract to make a survey of three downtown Newark sites recommended by the mayor's parking committee for construction of multi-deck parking garages.

NEW YORK: Support for adoption of the so-called "Buffalo Plan" for attacking New York City's parking problems has been voted by the City Council.

The city, under the plan, would issue bonds to provide funds to acquire off-street parking lots, especially in congested areas. Then businessmen, particularly merchants in the affected districts, would form corporations to lease and operate the parking facilities.

The plan has the backing of Robert Moses, city construction coordinator, and Traffic Commissioner T. T. Wiley, but business groups have expressed opposition to the scheme.

OHIO: Sale of $1,450,000 worth of mortgage revenue bonds for the city's first municipally owned parking garage was approved early in April by the Columbus City Council, which at the same time voted down a motion that the city lease the facility to private operators as soon as possible.

The $1,450,000 bond issue was the first part of $4,000,000 in bonds which the Columbus City Council agreed to issue for off-street parking facilities.

The city expects to award a construction contract around May 10 for the

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first garage, which will be located on the north side of Long St., between Pearl and Third Sts.

The successful bidder will be given 15 days to start construction and about eight months to complete the structure.

The ramp-type garage will store 577 cars with about half the facility self-parking and the other half attendant parking. Parking charges will be competitive with prices of privately owned lots in the downtown area.

OREGON: A group of private investors, headed by J. A. Hull, has submitted plans to the Portland City Council and other city officials for a proposed four-block parking structure.

The group proposed construction of a two-level parking structure with one level below ground and the two level rising in four units in each of the four park blocks between S. W. Salmon and Columbia Sts. Landscaped areas would be provided on top of the structures, connected by pedestrian bridges over intersecting east-west streets.

The private investors, under their plan, would be given use of the property under a nominal lease fee in return for provision that the structure go to city ownership after 50 years, a method provided by state law on municipal acquisition of off-street parking.

Portland City Attorney A. G. Brown said a court ruling on whether the city has the right to use the park property in such a manner should be sought before any money is invested. He also said it probably would be necessary to get a court decision on whether the city would permit use of area under the street, as proposed by the planners. Their plans call for underground levels of the proposed garage to extend beneath S. W. Park Ave. and S. W. Ninth Ave.

In another Portland development, Mayor F. L. Peterson appointed a five-member citizen's committee to study the city's off-street parking problem and make recommendations. The mayor told the committee that all facilities of the city will be available for its study.

Named to make the study were M. J. Frey, president and publisher of *The Oregonian;* W. W. Knight, publisher of *The Oregon Journal;* F. A. Dresslar, vice-president and general manager of the Pacific Telephone and Telegraph Co.; W. P. Yaw, president Yaw's Top Notch, and E. W. Smith, Portland businessman.

The mayor said it was his hope "that your committee will determine whether or not there is need for off-street parking to be provided by the public and, if your answer is in the affirmative, what method you would recommend. This is an urgent need for Portland inasmuch as there is a great deal of feeling on both sides." The mayor urged an early report.

PENNSYLVANIA: A $25,000 survey is being made in Philadelphia of possible parking facilities in the Penn Center project. The survey is being sponsored by the Philadelphia Parking Authority and is being paid for by the City Planning Commission.

In Harrisburg, five businessmen were named in mid-April by Mayor Robins to study the city's off-street parking problem and report back in 60 days. The action was taken at request of four city business establishments which last year put up $100,000 to launch a parking solution.

The five-man committee consists of F. F. Davenport, Jr., managing owner of Davenport Restaurant; C. Vance Seidel, vice-president, Dauphin Deposit Trust Co.; J. B. Delaney, controller and director of Bowman's; F. W. Nichols, department head, Miller's Furniture Store; C. S. Shenk, partner in Shenk & Tittle, sporting goods store. The $100,000 was put up by Miller's Furniture Store, Bowman's, Pomeroy's and The Patriot-News Co.

VIRGINIA: After rejecting a proposal for the creation of a Richmond Parking Authority, the Richmond City Council recently called for a new study of off-street parking facilities in the city.

The authority proposal was killed on recommendation of a council committee, which said the council "now has all the powers needed to establish adequate off-street parking facilities" and contended the "disadvantages of an authority outweigh the advantages."

Obituaries

F. M. Carter

Mr. Frederick M. Carter (Member, ITE) and former Director of the Institute (1950-52) died Saturday, May 1, following several weeks of illness and hospitalization. Sixty-eight years of age at the time of his passing, he was the Assistant Traffic Engineer of the State Division of Highways, Sacramento, California. He is survived by his widow, Vetabelle P. Carter of Ashland, Oregon, and his daughter, the noted concert pianist, Paulena Carter Wormser of Woodland Hills, California.

A graduate of Yale University, "Nick" engaged in railroad engineering work in the state of Washington, and served as city engineer for the city of Ellensburg, Washington. He went to California in 1914 where he was a contractor on numerous dam and irrigation projects throughout the west coast area. He joined the California Division of Highways in 1934.

"Nick" was also a past president of the California State Employees Association. In the field of traffic engineering, he was one of the pioneers in bringing traffic actuated signals into use in the west, and was recognized as one of the leaders in the development of the mercury vapor and more recently the fluorescent safety lighting at highway intersections.

T. Elmer Transeau

T. Elmer Transeau (Member, ITE) died suddenly at his home on April 9. He was 63 years of age. As Director, Bureau of Highway Safety, Pennsylvania Department of Revenue, Mr. Transeau was one of the most widely known and respected traffic safety officials in the country. He had served as Director of the Bureau of Highway Safety since 1939. Prior to that he had been Traffic Engineer, Assistant Director and Acting Director of Public Safety in the city of Philadelphia. He was one of the pioneers in the belief that motor vehicle operators are the major factors in traffic accidents. He was one of the first to initiate a system of post-licensing regulation and control of drivers. Mr. Transeau was largely responsible for the adoption of license suspension procedures for speeding convictions in Pennsylvania. He gained wide recognition as the leading exponent of this type of speed control, a procedure which immediately had and still retains the effect of reducing traffic accidents. He originated the axiom: "The left turn, like the poor, we shall always have with us."

In addition to being a member of the ITE, Mr. Transeau was a member of the American Association of Motor Vehicle Administrators, National Committee for Traffic Safety, National Committee on Safety Films, National Committee on Traffic Accident Records and was Executive Director of the Governor's Highway Safety Advisory Committee of Pennsylvania.

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B-4PB Four-Way Bracket Pedestal Assembly for Whiteway or Utility Poles

Sure they are America's most readable street name assemblies . . . and what's more they are a sign of efficiency and city pride. Miro-Flex two- and four-way street name assemblies are used by the nation's most progressive towns and cities. Uniformity and quality workmanship assure you of a good investment. Four-inch letters embossed on six-inch, 18-gauge, zinc-coated, Bonderized steel plates give you maximum legibility. Yes, you and the citizens will be glad you chose Miro-Flex.

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Also available as B-2P Two-Way Pedestal Assembly

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The assemblies shown are merely indicative of the Miro-Flex line. Be sure to investigate the entire line before you buy.

Write for your free copy of "SIGNS BY MIRO-FLEX," which describes all Miro-Flex Traffic Control Signs.

THE MIRO-FLEX CO., INC.
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Young

pitchers were ruining signs

until Highway Engineers tried Alcoa Aluminum Sign Blanks

The "clang" of stone striking steel may be music to a young marksman's ear—but it can sound the death knell for ordinary highway signs. For once the paint film is chipped, relentless rust sets in—destroying legibility and eventually the sign itself.

Prompt and costly repainting is one answer. Traffic engineers in *24 states* have found a better one—Alcoa® Aluminum. Since Alcoa sign blanks can't rust, there is no progressive peeling of paint, no damage to metal when the message film is breached. Any needed repairs can wait indefinitely while the sign stays on the job. And because aluminum weighs only half as much as steel, important savings are also realized on shipping and erection.

GET COMPLETE INFORMATION

Contact your local Alcoa sales office for full information on Alcoa highway sign blanks, including price and size data. Your Alcoa sales engineer is prepared to work with you on problems of fabrication and finishing for signs and markers, as well as bridge railings, gratings, lighting standards, barricades and fencing of Alcoa Aluminum. Write for the booklet, *Highway Accessories of Alcoa Aluminum*. ALUMINUM COMPANY OF AMERICA, 1979-F Alcoa Building, Pittsburgh 19, Pennsylvania.

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Fast Movers or Shelf Warmers?

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Multiple-Unit Reset Counter

Vary-Tallies help you separate the sheep from the goats, the big ones from the little ones, the red ones from the green ones—in manufacturing, sales accounting, researching and what not!

Vary-Tallies will do *any* counting job you want in any combination up to 6 banks high, 12 units wide (with a minimum of 2 units wide). Yes, you can count on 'em or with 'em *to your profit* note these features of construction:

- **Easily Readable from Any Angle . . . Bold figures Always Centered in Window . . . No Glare . . . Figures not Covered by Fingers in Operation**
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How Can the Vary-Tally count for you? Write for news sheet and prices.

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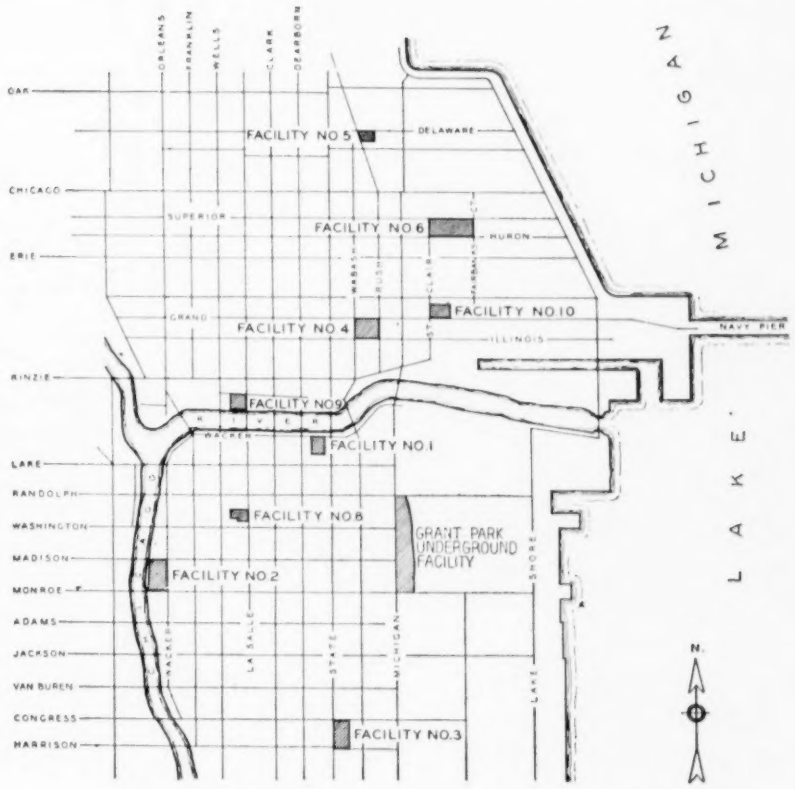
TRAFFIC NEWS

Chicago's $50,000,000 Off-Street Parking Program Well Under Way

The Chicago City Council adopted an ordinance on September 18, 1952 authorizing the issuance of revenue bonds for the development of parking facilities. This was the green light that has given Chicago one of the most ambitious and advanced off-street parking programs in the country. Under this ordinance bonds in the amount of $50,000,000 can be issued. One of the excellent features of this program is its flexibility. New facilities may be built anywhere in the city as parking needs arise, providing financial prospects are good. In many other cities, revenue bond programs have been limited to small areas, and as needs developed in other locations, additional bond issues had to be floated. The danger of this type of financing is the possibility of failure of one of the issues which jeopardizes development of future needed projects in the city. Under Chicago's program there is but one bond issue and earnings from all facilities are to be pooled with subsidies from parking meter revenues so that the entire city program will not be hampered by any financial weakness that might arise in individual units.

The cover photo shows the Chicago Park District's underground garage going into its final stage of construction. Along with this Grant Park Garage are nine off-street parking projects that are a part of Chicago's $50,000,000 program. The location map of parking facilities shows these nine locations and the Grant Park Garage site. By the middle of 1955, the scheduled date for completion of all of these structures, there will be provision for a total of 9,126 parking spaces. Site Nos. 1, 2, 8, and 9 are already under construction, while the architectural plans for the remaining five structures have been prepared and negotiations for sites are in progress.

In addition to this month's cover, the June, 1953 cover of TRAFFIC ENGINEERING was a photo of World Famous Michigan Avenue during construction stage one of the Grant Park Garage.



LOCATION MAP OF PARKING FACILITIES

Significant Features Of Chicago's First Underground Garage

Capacity: 2,359 cars.

Parking levels: two plus mezzanine with space for 130 cars.

Ramps: 2 egress and 2 ingress all in Michigan Avenue; radiant-heated. (Note 2 ramps at right on cover). Ramp in middle of Michigan Avenue is for ingress and the other for egress. Another pair is at far end (south) with the one in middle of avenue for egress and the other for ingress.

Control facilities: Green ceiling ribbon lights will direct motorists to areas where parking spaces are available. Red lights will indicate no space available. Lights will be electronically controlled.

Traffic movement: Vehicles will be checked in and out on the upper level where there will be 9 lanes at the check point. During the A.M. rush period all but one of the lanes will be used for incoming vehicles. During the P.M. rush period all but one lane will be used to check outgoing vehicles. At other times the number of lanes may be reduced to suit direction and volume.

Pedestrian facilities: Internal arrangements are such that no pedestrian movements will conflict with major vehicular movements. Three sets of stairs are provided for pedestrian entrance and exit. Escalators are provided for up movements. The three pairs of stairs are all on the west side of Michigan Avenue thereby eliminating need for crossing the avenue on foot.

Type of parking: Customer at regular fees and attendant at extra charge.

Construction cost: $6,750,000.

Consultants: Ralph H. Burke, Inc., Chicago.

There is no question that Chicago's off-street parking program is well underway.

NOW CROUSE-HINDS

complete line of

NEON Signals

gives you **4** distinctive models

Type TNA-1
Arrow Neon Signal

Type TNO-1 One-Line Neon Signal

Type TNO-2
Two-Line Neon Signal

A Nationwide Distribution Through Electrical Distributors

Type TNO-3 Two-Line Neon Signal

Each does a special job better than any other signal.

The addition of two new signals, Types TNA-1 and TNO-3, increases the Crouse-Hinds family of neon signals to four different models . . . a complete line to meet your every need. Neon signals are ideal for the control of pedestrians and their large brilliant letters are perfect for route markers and information signs.

Type TNA-1 The big bright arrow is just what you have been waiting for. It can be seen farther, and maintains its shape at greater distances, that any conventional arrow. Drivers "read" the signa sooner and proceed with assurance. The result is greater safety and faster flow of traffic.

TNA-1 can be added to any conventional traffic signal.

The **TNO Series** is primarily for pedestrian control. Because of their distinctive shape and color, they command obedience, resulting in fewer pedestrian injuries.

Type TNO-1 is a one-line neon signal with up to ten 4½-inch high letters.

Type TNO-2 is a two-line signal with shorter lines. It is useful where width of sidewalk and pole location must be considered.

Type TNO-3 is the latest addition to the TNO Series and combines the advantages of TNO-1 and TNO-2 in a single unit. It not only has two lines but each line is full length . . . up to ten letters. It can handle jobs that are beyond the capacity of the other units. For example, you can have a full length DON'T WALK signal in *Red*, the danger color, on the upper line and also a WALK signal in *Green*, the safety color, on the lower line. The extra letters . . . up to twenty in all . . . make this unit more valuable for use as a warning or information sign.

All neon signals can be furnished with slip-fitter mountings or with brackets for pole mounting. They are available in two-way assemblies.

Crouse-Hinds neon signal housings are cast aluminum, rigid, light weight, and both dust-tight and weatherproof. They are built to Crouse-Hinds high standard of quality and will give years of dependable service.

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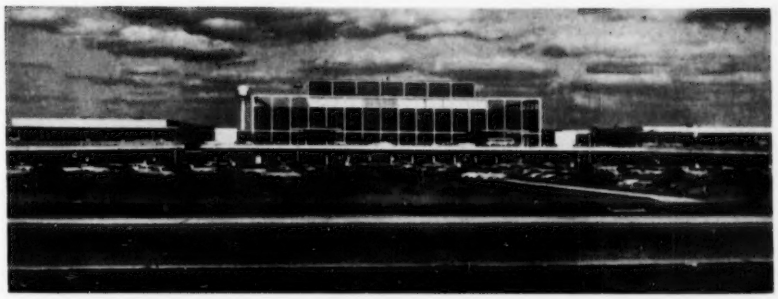
TRAFFIC SIGNALS · CONDULETS · FLOODLIGHTS · AIRPORT LIGHTING

Detroit's New Center Has Unique Traffic And Parking Program



As the site for the world's largest regional shopping center was chosen primarily for accessibility by automobile, the engineering for traffic flow into and around Northland Center received the highest priority in planning and building the project.

Data from the experiences of regional shopping centers already operating near other large cities established a pattern of volume, peak hours and other factors which permitted an "educated guess" on traffic potentials at Northland and over the highways and roads approaching the site.

The predicted traffic volumes enabled Northland engineers to design the traffic system inaugurated for the project. The anticipated volume at the site itself determined the size and type of the parking area, which consists of nine lots—none larger than 900 spaces— accommodating a total of 7500 cars, with expansion projected to 11,500 cars. The expected traffic volume over approaching roads, added to the normal volumes carried by these roads prior to the opening of Northland, determined the improvements necessary for immediate completion, and those for the future.

The traffic problem was complicated by the fact that the anticipated peak loads at Northland—from 7 P.M. to 10 P.M.—would immediately follow the low peak normal traffic not associated with the Center—from 5 P.M. to 6 P.M. Traffic facilities were studied for a considerable distance away from the Center to make sure no congestion would develop under peak loads.

Already road improvements have been completed along the Center to facilitate the flow of traffic. Eight Mile Road has been widened to three lanes on each side as far West as Southfield Road. Greenfield Road now has two lines of lanes of traffic on either side of a center island between Eight Mile and Nine Mile Roads. Northwestern Highway has three lanes of traffic between Eight Mile and Nine Mile Roads.

Whichever way they approach the Center, Northland shoppers will find parking areas convenient to their use. And, the parking spaces on the extreme perimeter of the parking areas are less than 500 feet from the stores of the Center—about one minute's walk.

The traffic flow approaching and within Northland has been engineered for the utmost convenience of the shopper. Opposing traffic lanes have been separated. Intersections have been eliminated. Extra lanes have been provided for acceleration and deceleration. Right-hand turns have been adopted almost exclusively.

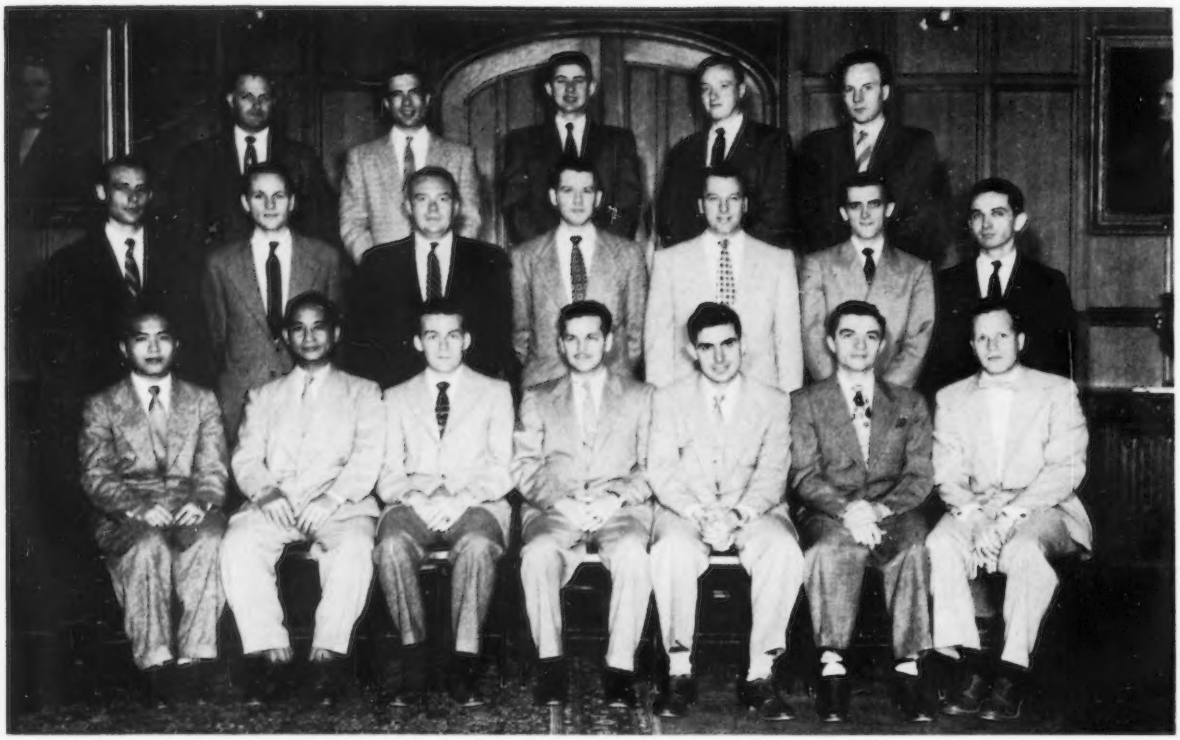
As an example of the painstaking engineering characteristic at Northland, the parking spaces are laid out on an angle so that one 52-degree turn enables the shopper to enter her space, and with the same easy, single turn, back out into a parking lane. Each space is amply large for the widest and longest of cars, and clearly marked on either side. Each space is so roomy that shoppers, even when all spaces are filled, may open the doors of their cars without bumping the autos alongside.

All parking lots are held to relatively small areas and clearly marked with signs of familiar design to make it easy for the shopper to find her lot and her car. The lots are designed for the shopper to enter at the left, circle to the right, and exit at the other side of the lot.

As the space markings are of luminous paint, parking at Northland will be easy and convenient at night under the floodlighting over the entire paved area of the Center.

Paved, raised walks lead from the parking lots to the stores of Northland. The shopper has no streets or alleys to cross; the "lifelines" to the Center—such as truck access and loading, mail pick-up and delivery, and conveyor systems are routed underground through special roads and tunnels, thus eliminating interference with the shopper's parking, entering, or leaving the stores of Northland.

The Northland traffic survey indicated that 30% of customer volume will approach from the Southeast and 9% from the Northwest, via Northwestern Highway—25% from the West and 5% from the East, via Eight Mile Road —18% from the South and 13% from the North, via Greenfield Road.



Yale Bureau Class Receives Certificates

Nineteen students received their certificates on June 7th from the Yale Bureau of Highway Traffic. At the farewell banquet held on May 26 the students and staff heard Mr. Joe Mattson, Automotive Safety Foundation President, extend congratulations for the ASF and address the 1954 Class upon their completion of the Bureau Course. Mr. Mattson summarized his message with the sage advice that "You should make no little plans and dream no little dreams." This year's class consisted of:

First row (left to right): Reyes, Salvador F., Instructor, Civil Engineering, Univ. of Philippines, Quezon City, Philippines. Rameos, Irineo Santos, Traffic Engineer, Div. of Highways, Bureau of Public Works, Manila, Philippines. Evans, Duaine T., Senior Traffic Analyst, La. Dept. of Highways, Baton Rouge, La. Villafane, Rafael C., Civil Engineer, Dept. of Public Works, Div. of Investigation of Roads and Bridges, San Juan, Puerto Rico. Solomon, David, Highway Transport Research Engineer, Bureau of Public Roads, 18th and F. Streets, N.W., Washington 25, D. C. Boulding, Ernest A., Senior Traffic Engineer, Bureau of Traffic Safety, Dept. of Public Safety, State House, Trenton, N. J. Galloway, William G., Traffic Engineer III, Kentucky Dept. of Highways, Div. of Traffic, Frankfort, Ky.

Second row (left to right): Conradt, Robert H., Asst. Traffic and Safety Director, Traffic and Safety Section New Mexico State Highway Dept., Santa Fe, New Mexico. Nordqvist, Stig R., Civil Engineer, A. B. Vattenbyggnadsbyran, Bureau of Consulting Engineers in Water Power, Water Supply and Sewerage and City Planning, Box 5030, Stockholm 5, Sweden. Hunnicut, James M., Jr., Traffic Engineer III, Bureau of Street Traffic, City Hall, Chicago 2, Illinois. Hibbard, Walter, Major, Office of the Chief of Transportation, U. S. Army, Washington 25, D. C. Kanz, Anthony C., Traffic Control Engineer I, Bureau of Traffic, Engineering and Electrical Supply Services, City of Milwaukee, Wisc. Wardell, Edward J., Traffic Engineer II, Traffic Engineering Div., Operations Dept., Port of N. Y. Authority, 111 Eighth Avenue, New York 11, N. Y. Marlow, Joseph A., Engineer II, Planning and Traffic Div., Michigan State Highway Dept., Lansing, Michigan.

Second row (left to right): Baker, Arthur L., Lt. Col., Transportation Office, Fort Richardson, Alaska. Fielder, David G., Automobile Club of N. Y., 62nd Street and Broadway, New York, N. Y. Leland, Elmer J., Senior Aide Engineer, Wash. State Highway Dept., District 1, Seattle Wash. Hartigan, Michael J., Civil Engineer I, Bureau of Engineering, Dept. of Public Works, 20 North Wacker Drive, Chicago 6, Illinois. Gotterod, Arne J., Civil Engineer, Public Roads Administration, Vegdirektoratet, Schwensensgt 7, Oslo, Norway.

IRF Sponsors European Lecture Series by D. C. Greer

Mr. D. C. Greer, Texas State Highway Engineer, Austin, Texas, is presently on a European tour and will present a series of lectures during the summer in eight European countries on the general topic of: American Highways and the Traffic They Carry. The lecture series is being sponsored by the International Road Federation.

Mr. Greer, who left for Europe on June 1st, was selected for the lecture assignment as one of the outstanding highway engineers of the United States and because of the recognized leadership Texas has shown in highway construction, operation and financing.

His principal address was at Oslo, Norway, before an assembly of more than 3600 delegates at the Scandinavian Technical Road Congress. The delegates represent Norway, Denmark, Sweden and Finland. Highway traffic operations and construction of secondary roads were the principal subjects discussed by Mr. Greer before the road congress. In France and Germany, Mr. Greer will lecture on the Texas expressway systems, while in Holland, and a separate talk in Denmark, his subject will cover traffic engineering. In Great Britain, Mr. Greer will talk on highway financing. In London he is to be the guest of honor of the newly formed Anglo-Texas Society. Mr. Greer later will inspect the continental highway systems with Douglas M. Clarke of the IRF-Paris office.

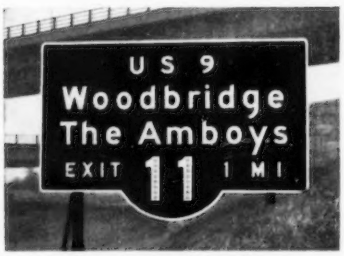
Mr. Greer joined the Texas Highway Department in 1937. He was appointed State Highway Engineer (chief executive) in 1940. He is a past president of the American Association of State Highway Officials, and in 1953 received the George S. Barlett award as America's outstanding highway engineer and administrator. Mr. Greer is an engineer graduate of Texas Agricultural and Mechanical College.

The Texas Highway Department spends approximately $150 million annually on its highway system. Of this amount some $100 million goes for new construction and $39 million for maintenance. Since 1940 Mr. Greer has supervised construction of 32,000 miles of new paved highways in Texas. The present paved mileage today exceeds 50,000. Read Mr. Greer's feature story this month in *Traffic Engineering*.

THERE ARE GOOD REASONS WHY

New York Thruway

Pennsylvania Turnpike



New Jersey Turnpike

. . . three major superhighway systems standardize on Stimsonite

The New York Thruway, Pennsylvania Turnpike and New Jersey Turnpike are all using Stimsonite as the reflective material for signs and markers because:

1. Stimsonite offers better *visibility* than any other material.
2. *Readability* of Stimsonite signs is superior at greater distances.
3. There is nothing to wear, chip or fade; Stimsonite has unequalled *durability*.

Be sure you're making the best long-term signing investment. Call your Stimsonite man or write us.

STIMSONITE® *for* — *Seeability* *Readability* *Durability*

AGA DIVISION

ELASTIC STOP NUT CORPORATION OF AMERICA

1027 NEWARK AVENUE, ELIZABETH 3, NEW JERSEY

MAKE IT EA$Y FOR YOUR CITY

with an easier system for collecting fines!

With the ever increasing number of vehicles on streets and highways... in addition to adequate parking facilities and traffic controls... a more efficient method of assessment and collection of minor violations is required. To maintain progress... Duncan Parking Meter Corp. is now INTRODUCING A PRACTICAL SYSTEM FOR THE COLLECTION OF FINES... the DUNCAN FINE-O-METER

EASY... and accurate accounting for fines... with reduced clerical personnel and equipment.

EASIER... for the motorist... convenient... no stamps... no money orders... no trips to police station.

EASIEST... method of creating goodwill... eliminates any embarrassing situations.

EASIER... installation... attaches without removal of meter head on any standard post.

EASY... collection of all minor traffic offenses.

BOOK OF TICKETS
Collection system includes pre-numbered ticket-envelopes with city imprint.

Our traffic specialists will gladly give you all the details — personally or by correspondence.

Manufactured by
DUNCAN PARKING METER CORP.
835 NORTH WOOD STREET CHICAGO 22, ILLINOIS U. S. A.
Makers of the DUNCAN-AUTOMATON fully automatic and the DUNCAN-MILLER manual parking meters

Congress Passes Record Federal-Aid For Highways Bill

The highest annual authorizations ever made for the various Federal-aid highway systems are contained in a bill which passed both Houses of Congress and has been signed by the President.

This total appropriation to be spent yearly for a two-year period begins with the fiscal years, July 1, 1955, and 1956. The measure, which is a compromise version of two differing bills passed in each chamber respectively, does not contain the controversial House-sponsored clause which would have made authorizations for the Interstate System contingent upon continuation of the Federal excise tax on gasoline at its present 2 cents per gallon level.

The following table shows the annual authorizations contained in the bill:

Authorization for:	1954 Act
Primary System	$315,000,000
Secondary System	210,000,000
Urban Areas	175,000,000
Interstate System	175,000,000
Total Federal-Aid	$875,000,000
Forest Highways	$ 22,500,000
Forest Roads & Trails	24,000,000
Park Service Roads	12,500,000
Parkways	11,000,000
Indian Roads	10,000,000
Public Lands Roads	1,000,000
Total Each Fiscal Year	$ 81,000,000

A precedent-making clause of the new bill provides that the Federal matching share for the Interstate System shall be 60 per cent. The present 50-50 formula is retained for all other categories.

The bill also changed previous Federal-aid procedure by apportioning 50 per cent of the authorizations for the Interstate System on the basis of population alone and the other 50 per cent on the present basis which takes into consideration area, mileage and population.

Included in the bill is a provision authorizing the Secretary of Commerce to include in a highway research program studies of economic geometrics, structures and desirable weight and size standards for vehicles using the public highways, and the feasibility of uniformity in State regulations with respect to such standards.

Authority for the Secretary of Commerce to make a comprehensive study of all phases of highway financing, including a study of the cost of completing the several systems of highways in the several states, and of the progress and feasibility of toll roads with particular attention to the possible effect of such toll roads upon the Federal-Aid Highway Program is provided.

Another provision of the bill would allow states to transfer up to ten per cent of the specific authorization for the Primary, Secondary or Urban Systems to one or both of the other two.

Traffic Authorities and City Officials

The **Portable Traffic Signal that meets YOUR Standards**

SPECIFICATIONS

Height—9′ 2″ overall.
Two 8″ wheels with rubber cushion tires.
Completely automatic; also manual control.
Self-contained battery charger, 110-volt.
Heavy-duty 6-volt battery, which will operate signal 18 hours continuously.

Easy on the traffic officer.
Easily handled by one man.
Easily wheeled off the street when not in use.
Easily transported to distant emergency spots by trailer.
Of course it's a portable signal.
In every essential respect it is a regulation-size traffic signal.
"TRAFFIC SENTRY", the portable traffic signal built by Portable Traffic Signals, Inc. was designed, constructed, and is sold to meet the standards set forth in the *Manual on Uniform Traffic Control Devices for Streets and Highways.*

Write for all the facts:

PORTABLE TRAFFIC SIGNALS, INC.
Manufacturers of the "Traffic Sentry"
1620 South Hill Street Los Angeles 15, Calif.

Philadelphia Road Plan Proposed By Experts

A billion-dollar twenty-five-year plan for the Philadelphia metropolitan section of the Delaware Valley has been submitted unofficially by the Greater Philadelphia - Delaware - South Jersey Council.

The plan, advanced by the council's Technical Advisory Committee on Highways after two years of study, features a system of twenty-eight expressways in the eleven-county area along the river between Trenton and Wilmington, Del., with Philadelphia as the hub.

The program would add 474 miles of expressways to the 228 already completed or under construction within the twenty-five-mile radius of midtown Philadelphia. It would mean, the council said, long-term savings of "hundreds of millions of dollars and would greatly stimulate" the economy of the district.

While the plan has no official sanction, it represents the thinking of leading highway and traffic engineers of the tri-state area and has the endorsement of the directors of the Chamber of Greater Philadelphia.

Among the thirty members of the Council's highway committee are Gerard B. Gilber, assistant to the chairman, Pennsylvania Turnpike Commission; Charles M. Noble, chief engineer; New Jersey Turnpike Authority; E. J. Kinney, district engineer, Pennsylvania Department of Highways; O. Herbert Fritzeche, director and chief road engineer, New Jersey State Highway Department; Ernest A. Davidson, Delaware State Highway Department; H. G. Van Riper, highway planning engineer, Pennsylvania Department of Highways, and Edmund N. Bacon, executive director, Philadelphia City Planning Commission.

The proposal has been submitted to the Governors of Pennsylvania, New Jersey and Delaware; the state highway departments of the three states, the Pennsylvania and New Jersey Turnpike Commissions, the Delaware River Port Authority and the Planning Commissions and Mayors of the tri-state section.

"This plan," said Frank G. Binswanger, council chairman, "looks at least twenty-five years into the future of highway planning in this rapidly expanding region."

He emphasized that the plan had been drawn to stimulate thinking on the "pressing need" for an over-all program to combat a "critical situation that has been growing like 'Topsy.'"

Mr. Binswanger also said that the additional superhighways, most of which would parallel existing major routes, would give a "tremendous boost" to the development of the Port of Philadelphia by facilitating the flow of traffic.

S. Herbert Taylor, chairman of the Council's Highway Committee, predicted that the program, estimated at $1,000,000,000, would repay its cost at least fourfold. He emphasized that a priority of projects should be determined by economic studies.

"Stepping-up the flow of traffic to and from and around the cities of the metropolitan area, particularly Philadelphia and Camden, has been one of the highway committee's principal considerations in the development of the plan," he said.

Other benefits, he added, would include increased safety, savings in the cost of vehicle operation and time, better access to places of business and increased real estate values.

LONGER RANGE—TARGET VALUE
FOR YOUR HIGHWAY TRAFFIC SIGNS WITH
GROTELITE REFLEX REFLECTIVE SHEETING

Grotelite
REFLECTIVE SHEETING
SMOOTH
S S
SURFACE

This highly reflective, smooth surface reflex reflective sheeting makes a smashing, attention-compelling sign with longer range target value and full range legibility. Easily read night or day. The smooth, durable, self-cleaning surface can be screened, sprayed or brushed. It is easy to apply and makes the best long life, economical signs and markers. Available in sheets and completed signs.

COMPLETE LINE OF EMBOSSED METAL TRAFFIC SIGNS, REFLECTORS AND STREET NAME PLATES

THE Grote MANUFACTURING CO., Inc.
GROTE SQUARE - BELLEVUE, KY.
(Established 1901)

Miscellanea

Federal-Aid Act

President Eisenhower, and Secretary of Commerce Weeks both gave the Federal-aid Highway Act of 1954, HR 8127, a nice shot in the arm. After approving same and signing with seven pens, President Eisenhower expressed gratification that the measure has now become law . . . "In recent years the nation has accumulated tremendous highway needs which are becoming increasingly acute . . . Our highways badly need modernization and expansion to accommodate today's vastly increased motor traffic . . . Large-scale improvement is needed simply to remedy deficiencies not met in the past" . . . Meanwhile Secretary Weeks had this to say . . . "The provision of $875 million for apportionment among the states for each of the fiscal years beginning in 1955-56 will make possible the biggest Federal Highway program in history to improve the national highway system, reduce traffic congestion, strengthen national defense, expand research in road improvements, and increase the comfort, convenience and safety of the users of the nation's 56 million motor vehicles" . . . See Traffic News section for a breakdown of this record Federal-Aid Act . . .

A sincere analysis by almost every city would bring ridiculous guesstimations to the forefront in evaluating the cost of traffic congestion, or strangulation, as you may wish to call it . . . certainly each large city must say it is in terms of 50 plus or 100 plus million dollars . . . this includes contributing factors such as wasted gasoline, extra vehicle wear, lost time, increased business expense, higher transit costs, decentralization, etc., etc., . . . congestion is not always just a growing pain, but for sure, it is always a direct product of the city itself . . . it is not common to rural or intercity routes . . . the U. S. BPR estimates that ten-percent of our national system is intra-city classification . . . and AASHO estimates that we dump about fifty-percent of ALL traffic into this funnel . . . conclusion . . . more federal highway funds should be devoted to intra-city network devolopment . . . if only because over half of ALL motor vehicle taxes generate there . . . Congress has recognized this, in part, in our new Federal-aid Act . . . urban areas receive 25-percent more dollars and of course more bucks go to major highways . . .

Motor Vehicle Registrations Up Again

Increase in motor vehicle registrations in the United States, in 1953, was more than double the increase in 1952, according to BPR . . . total registrations of all types . . . 56,279,864 . . . up 3,000,000 . . . 46,460,000 passenger cars . . . 9,576,000 trucks . . . 244,200 buses . . . registration is up 61 percent over 1941, while travel in vehicle miles is up 62 percent over 1941. . .

"Piggy-Back" Riding Due Before ICC

The ICC will hear oral argument later this month on twelve questions involved in the movement of highway trailers by rail . . . ICC says its purpose would be issuance of a declaratory order on twelve "basic and fundamental" questions developed by the ICC from inquiries presented by railroad groups, motor carrier people and others . . . this means, I suppose, that answers will be sought . . .

New York Thruway

Toll schedule for passenger cars, trucks and buses on the 400-mile cross-state expressway (Buffalo-New York City) . . . 1.25 cents per mile for passenger vehicles . . . 1.75 to 5.0 cents a mile for truck varieties . . . 3.5 cents a mile for buses . . . virtually all will be opened by New Year's Eve, 1954 . . . thirty-seven toll booth facilities will function . . .

Miscellaneous Miscellanea

After more than a year of operation, Philadelphia's downtown parking ban appears to have been a complete success . . . ban covered 112 downtown blocks . . . R. K. Sawyer, Philadelphia managing director, says operating speed of autos and trucks has been increased 42 to 51 percent, while speed of trolleys and buses has increased 27 to 40 percent . . . St. Louis also has successful parking ban in operation . . . in both cities ban meant removal of relatively few parking spaces in favor of moving traffic . . . everybody now hurrying to find another place to park . . . Quote of the month . . . Eve Arden told me in a letter recently . . . "If there's anything I can't stand it's pedestrians . . . Why don't they get cars like everybody else and defend themselves?" . . . Rhode Island's only expressway, the Dennis J. Roberts Expressway is now carrying 34,600 cars a day as compared with 1970 estimates of 31,850 . . . Mike Gitten's city—12th in the nation— Pittsburgh, had a small problem last month when 2700 transit company employees went on strike . . . Mike said somewhere downtown (Golden Triangle) there are 16,000 off-street parking spaces . . . 98,000 vehicles are poured into the Triangle area each day between 8 and 4 . . . estimate was that 30 percent more cars lined up to get into city . . . results . . . Steel-City Stalemate . . . Bluefield, West Virginia has no parking problem . . . they knew the car was here to stay, and sometime ago bought a 46,000 sq-ft tract of land in the center of town . . . 1948 they built a 4-level-800 vehicle structure at $495,000 plus $114,000 for property . . . thirty year self-liquidating bonds . . . Bluefield's problem (21,000 people) already solved . . . Hats Off to those clairvoyant citizens . . . IMSA Convention (59th) . . . Hotel Ambassador, Atlantic City . . . October 4 to 7 . . . no fatalities on New Jersey Turnpike for month of March . . .

Parade Follows Paint Lanes!

Mr. W. E. Ducker (Associate Member, ITE), Traffic Engineer, City of St. Petersburg, Florida, has forwarded the photograph of their Annual Festival of States parade, held in April. The photo's many interesting features include a typical left turn lane at 3rd Street. You are looking east on Central Avenue toward Tampa Bay. At 4th Street, left turns are prohibited and the center line widens to form a two-foot median strip. Convenient feature of their new 60-foot black-top pavement is that the joints were carefully laid so as to fall precisely on the centre line and lane lines. In laying out the left turn lanes, all that was done was to measure the off-sets from the center line joint. Stop bars are 20 inches wide, lane lines 4 inches, and crosswalks 10 inches. Left turn lanes provide storage space for six vehicles.

Ristroph Changes Jobs

Mr. Paul L. Ristroph, Director, ITE, assumed new duties as Director of Utilities, City of New Orleans on April 27th . . . the last personality review of Paul's work appeared in the September, 1948 issue of TE . . . this month's Frankly

Paul L. Ristroph

Speaking column is also his . . . in his new work he will have supervision over transit, electricity, gas, ferries, taxicabs, sight-seeing buses, railroad switches, servitudes, telephones, etc., which also means a very fine opportunity to serve the New Orleans area for the newly appointed Director . . . Paul's traffic work had its origin in 1931 with the City of New Orleans . . . received his traffic training at Harvard (1937-38) . . . an EE graduate from Louisiana State University . . . he has also served as a Traffic Analyst, Federal Works Agency, Washington, D. C. (1939) . . . 1940 to 46 as an officer of the U. S. Army . . . and since 1946 has been associated with the New Orleans Public Service, Inc. as Traffic Engineer . . . 1950 to 1953 Paul served at Director of Civil Defense for City of New Orleans . . . He is a member of Tau Beta Pi and Phi Kappa Phi, Honorary Societies, APWA, ITE, President of the Southern Section, of ITE, and an active participant in many New Orleans area organizations . . .

Haley Becomes Phoenix, Arizona, TE

Charles E. Haley (Jun. Mem., ITE) was appointed March 1, 1954 as City Traffic Engineer of Phoenix, Arizona to replace the late R. Wayne Morris who passed away December 7, 1953. Haley had been Acting Traffic Engineer since December 9, 1953.

The Traffic Division, under Public Works Department, City of Phoenix, was formed in June of 1950. R. Wayne Morris was the first traffic engineer of Phoenix and Charles E. Haley was the first assistant traffic engineer. The division has grown considerably since its inception, having started with thirteen employees and now having a total of twenty-nine employees. The division manufactures all street name signs, traffic signs and informational signs used in the city. A complete street signing program has been completed by the division and all signs were manufactured and installed by the division. The divi-

Charles E. Haley

sion is responsible for street painting, installation of traffic signals, traffic accident investigation, approval of street paving plans and driveway permits and the installation and repair of parking meters. The City of Phoenix has a population of 139,000 people with approximately 290,000 population in the metropolitan area. Phoenix is the largest city in Arizona and is the state capital, famous for its mild healthful climate and is located in the center of Maricopa County, which ranks third highest in the United States for the value of its agricultural products.

Chuck Haley, as he is known by most people, is a registered Professional Engineer in Arizona. He graduated from the University of Michigan with a B.S. in Civil Engineering after having served four years in U. S. Naval Aviation. During 1950 Haley worked for the Vehicle Characteristics Committee of the Highway Research Board and was co-author with Mr. Thomas J. Carmichael of the award-winning paper presented at the January, 1951 Highway Research Board Proceedings in Washington, D. C.

In February, 1951 Chuck joined the Traffic Engineering Division of the City of Phoenix as Assistant Traffic Engineer which post he held until February, 1953. During 1953 he joined Associated Consultants, Evanston, Illinois as Traffic Engineer.

Chuck Haley is a Junior member of the A.S.C.E., American Public Works Association, Highway Research Board (Associate member), a director of the Maricopa County Chapter of the National Safety Council, a member of the I.T.E. committee on Traffic Safety Devices and the Junior Chamber of Commerce.

Albertus, Yale News Bureau

European traffic engineers inspect traffic control equipment in the Yale Laboratory of Highway Traffic. Thirty-two traffic engineers representing 11 European nations visited Yale University for a two-week session of lectures and field trips to acquaint them with traffic management. The tour in this country is sponsored by the Foreign Operations Administration. Shown above are (left to right) Edward A. Mueller, Research Assistant, Bureau of Highway Traffic, Yale; Wilhelm Klingenberg, Director of Engineering, Federal Ministry of Transport, West Germany; Alberto Rossi, Commanding Officer, Rome Center Traffic Company, Town Police Force; Sedat Mengiliboru, Chief, Traffic Safety Division, General Directorate of Highway, Turkey, and Charles Boulestex, Chief Engineer, Technical Control Office, Paris.

QUIZ

The following contest offers no prize, other than the mental satisfaction that you are up to date on who is an officer in what . . . obviously this contest could become an infinite series . . . but we think that this will be very indicative of your knowledge of members throughout our field and allied areas . . . Score accordingly . . . 18 to 20 correct . . . you must have cheated . . . 15 to 18 right . . . somebody helped you . . . less than fifteen . . . that's more like it . . . answers may be found on page 351.

Org.	Office	Answer
NHUC	Director	
PAR	Chairman	
IMSA	President	
NSC	Director (Traffic)	
BPR	Commissioner	
HRB	Director	
ITE	President	
YBHT	Director	
ITTE	Director	
ASF	President	
AAA	Director (Safety & Traffic)	
AASHO	President	
IRF	Executive Director	
PNYA	Director, Port Development	
AAMVA	President	
ARBA	President	
ENO	Resident Traffic Engineer	
ABTTA	Secretary	
AMA	President	
ATA	President	

Choices

1. G. W. Mason
2. L. Wingerter
3. A. Veglia
4. R. E. Schmidt
5. A. E. Johnson
6. R. M. Reindollar
7. A. C. Butler
8. R. A. Gilman
9. J. Mattson
10. J. A. Stearns
11. R. O. Swain
12. B. W. Marsh
13. H. E. Davis
14. T. M. Matson
15. D. M. McNeil
16. F. W. Burggraf
17. D. M. Baldwin
18. F. V. du Pont
19. C. D. Johnston
20. S. R. Wilkinson

A panel discussion on the question "The City Traffic Muddle—What Exit?" by a group of specialists who know the problem from first-hand experience featured one of the sessions of the Fifth Highway Transportation Congress recently held in Washington, D. C.

The Congresses convene every two years under the sponsorship of the National Highway Users Conference and its program draws hundreds of highway transportation leaders from all parts of the nation.

The city problem panel shown above includes: seated (left to right), D. C. Greer, Texas State Highway Engineer, and Hon. David Lawrence, Mayor of Pittsburgh. Standing, left to right, are: Henry A. Barnes, Director of Traffic, Baltimore; William S. Lampe, Editor-in-Charge of Hearst Better Roads Campaign and panel moderator; and Glenn C. Richards, Director, Public Works Department, Detroit.

Representatives of the five State Highway Departments receiving the first annual "Golden Milestone" Award for outstanding highway program reporting are shown with officials of the National Highway Users Conference at the Fifth Highway Transportation Congress, Hotel Mayflower, Washington, D. C.

The Golden Milestone of Rome, which was the theoretical origin of all roads of the Empire, was selected by NHUC as symbolic of the progressive steps undertaken by highway departments to inform the public on road development programs. Miniature replicas of this famous milestone will be presented soon at ceremonies to be held under the auspices of the State Highway Users Conferences in Colorado, Maryland, Massachusetts, Oklahoma and Washington.

Above, from left to right: Russell H. McCain, Chairman, Maryland State Roads Commission; Leroy A. Powers, General Counsel, State Highway Department, Oklahoma; Nicholas Kelley, Jr., Secretary, Chrysler Corporation and Chairman, NHUC Award Committee; Albert Bradley, Chairman; and Arthur C. Butler, Director, and Roy E. Jorgensen, Engineering Counsel, of the National Highway Users Conference; Mark U. Watrous, Chief Highway Engineer, Colorado; H. Gordon Gray, Chief Engineer, Massachusetts Department of Public Works; and Maurice Van Mechelen, Safety Director, State Highway Department, Washington.

DON'T FORGET

THE

25th ANNUAL MEETING

The Important Half of Traffic Engineering

Merwyn Kraft, Chairman of the ITE Ways and Means Committee has supplied us with the following comments from a letter addressed to him in response to one of his Committee's inquiries. These thoughts about the other half of the traffic engineering profession —the Human Half—carry a 100 percent perfect message to each one of us . . . We hope you agree.—EDITOR.

Dear Mer:

. . . For what they are worth here are a few random thoughts prompted by your letter of March 11th.

Each year we dutifully print on the inside cover of our Year Book a definition of traffic engineering. That definition, while possibly technically adequate in its formal phraseology fails utterly to convey what to me has always been a most appealing side of traffic engineering—I mean the "human" side. Whereas our fellow engineers in other fields often find themselves concerned with the circulation of fluids in conduits or electricity in cables, traffic engineers deal directly and constantly with the circulation of human beings in streets and highways—and what a whale of a difference *that* makes!

Everything a traffic engineer does with his signs, signals, markings, or with his one-way streets or parking regulations, translates into immediate and direct effect on the daily lives of all of us as soon as we leave our homes. If he does a good job he can be sure that at the end of the day he has brought a father safely home to his waiting family and has saved a little child from a tragic ending to his homeward romp from school. Sentimental? Well perhaps, but I've seen the eyes of a tough traffic cop as he straightened up and turned away from a little limp form on the roadway.

Aside from the traffic engineer's role in saving lives and preventing injury we come mighty close to the human side when by producing efficient traffic flow we make life a little easier, produce more leisure time, and open new vistas to more people. The imprint of the traffic engineer is increasingly heavy on the pattern of our civilization. He is playing a major part in determining where and how people will live, work, shop, and play, and what our future communities are going to look like. Earthbound in 2-dimensions today, how long will it be when we find ourselves concerned with techniques of 3-dimensional movement?

Again human nature figures closely in the life of the traffic engineer when one realizes that a great many of the things that we do or try to do to prevent people from killing and maiming themselves have literally to be shoved down their throats—a rather mixed metaphor, but as a traffic engineer you know what I mean. All too often the traffic engineer can expect little or no thanks for the job he does, but on the other hand he can be sure of plenty of criticism and free advice from the thousands of citizens who employ and pay him, most of whom are by their own admission thoroughly qualified traffic engineers in their own right. Our fellow engineering professions seldom enjoy (?) this type of close professional cooperation from the public.

Further bearing out my thoughts on the human aspects of traffic engineering is the strong conviction that of the traffic engineers I have known throughout the country—and I have been privileged to know and work with a lot of good ones—the most effective and most successful are those who "like" people. Ivory tower theorists will do better in professions other than traffic engineering.

It has always seemed to me that what I have called rather loosely the human side of traffic engineering can well make a strong appeal to many of the younger generation who may be considering a technical career. I think too that many of us who have played our varied roles in the profession as it has grown over the years, will agree with me that a good deal of the satisfaction and comfort that has come to us has stemmed from the human relations side of the job with which we have been concerned. . . .

Sincerely,

PAUL L. GREEN,
(Member, ITE)

Automatic Signal Division
Norwalk, Conn.

● The death of two small brothers on their way to a school hayride party is a tragic and costly example of how important proper traffic warning signs are to safety. There is no real protection without them.

LYLE SIGN CO. INC.
2120 University Ave. S. E.
Minneapolis, Minnesota

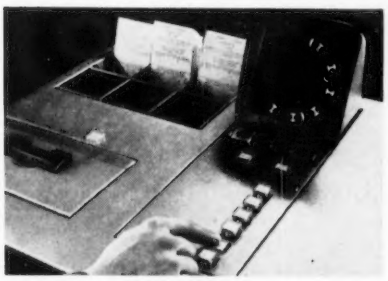
Reprinted from the Minneapolis Tribune, March 8, 1954

Too Late—There's a stop sign now on county road J at its intersection with highway 8 on the Anoka-Ramsey county line. There had been one there until a few days ago when someone took it. While it was gone, two Fridley brothers, Raymond, 13, and Allen Sederstrom, 12, were killed when a truck and a car collided at the corner.

Strictly Business

IBM Develops New Toll Collection And Audit System

A new toll collection and audit system which provides greater operating efficiency, increased revenue protection, and more equitable vehicle classification for turnpikes and toll roads has been developed by International Business Machines Corporation. The new system, a combination of photoelectric "eyes," specially-designed weighing treadles, and toll recorders, requires no special procedures on the part of motor vehicle operators, since all weighing and counting operations are performed while the vehicle is in motion. Even when following bumper to bumper, vehicles may be processed without delay.



Reading clockwise on the "axle group indicator" atop this new IBM toll recorder are the axle and bumper patterns of a four-axle vehicle followed by a two-axle vehicle, both of which have just been weighed. The toll operator has depressed a three-axle key, perhaps not noticing that the trailer truck being processed has dual rear wheels. This discrepancy caused the indicator to flash the pattern on its screen enabling the operator to recheck the vehicle, correct his error and process the vehicle without delay. This device is an integral part of the new IBM toll collection and audit system.

Developed after years of research and testing by the International Business Machines Corporation, this new system provides more equitable weight classification, added revenue protection, and greater control over all toll operations.

When a vehicle approaches the toll booth, a special weighing treadle built into the traffic lane's pavement separately weighs each axle, and a photoelectric detector counts the number of axles. These weights are retained by load cells and electronic storage units for vehicle classification.

At the same time, the toll attendant, having inserted a fare card in the IBM toll recorder, determines by visual inspection the number of axles on the vehicle and depresses a corresponding key on the recorder. Depression of the proper axle key automatically totals the individual axle weights and registers the vehicle's classification, along with other necessary information, on the fare card. The class of vehicle is determined when the individual axle weights are added together by the depression of the proper axle key.

An axle group indicator atop the toll recorder lights up to display the axle pattern of the vehicle if the operator depresses the wrong axle key, and the recorder locks to prevent improper validation of the fare card. The attendant, at a glance, may correct his error by depressing the proper axle key.

The fare card, indicating the amount to be paid for the trip, is given to the vehicle operator, who presents it at the exit gate with his toll.

At the exit interchange, the equipment automatically reweighs the vehicle and compares the weight class punched by the entrance recorder with weight class determined by the exit classifier. It also reads the number of axles and the time punched by the entrance recorder, thus enabling the toll collector to note any misuse or violation of toll tickets.

The information recorded in the fare cards by both the entrance and exit recorders makes practicable excess time detection, overweight protection and individual control of transactions. Without requiring additional key-punching of information into these cards, the central auditing may be completed by IBM's Type 650 calculator. This new "brain," in one pass of the fare cards, will compute all revenue, compile traffic density data, total charges by account number and provide a means of quickly auditing collectors' daily work reports.

The Pennsylvania Turnpike and Ohio Turnpike Commissions have placed orders for this new toll collection and audit system.

Strapping Bus Route Identification Signs

A new sign hanging application is developing very fast throughout the country, in small towns as well as in the larger cities, as the trend continues to increase toward discontinuing street cars and replacing them with buses. In most cases, these buses funnel through a business section, and where there are a number of different route buses stopping at the various intersections, then it becomes imperative to hang some kind of information signs at the stops for the riders' guidance.

In the City of St. Louis, special new marking signs of this nature are being put up by the St. Louis Public Service Company in accordance with the new St. Louis master traffic control ordinance, using A. J. Gerrard Strapping, Brackets and equipment.

Black and white local service pendants and red and white express pendants, giving both name and route number of the line, are fastened together and installed as a unit at all stops in the central downtown district to help passengers identify the new routes and stops.

Using No. 2114 Galvanized Sign Brackets and No. 311½-GB or No. 311-SS Steel Strapping, the service crews were able to install the new signs very rapidly and with considerable savings. In cases where the signs became unduly heavy due to a large number of pendants, the strapping was double looped as an additional safety factor.

Plywood Signs Cut Replacement Costs

Tacoma, Wash., has sharply reduced the cost of replacement on stop and other regulatory and warning signs by using resin overlaid fir plywood. According to Tacoma's traffic engineer, the signs have two important advantages. Vandal's can't wrap them around the post and they don't chip or rust when struck by rocks and bullets.

As a result the city is replacing all its existing signs with the resin overlaid plywood signs. The replacement program began about 18 months ago and since then about 4,000 of the new signs have been placed in service, about two-thirds of them reflectorized. Replacement has moved forward most rapidly in areas where vandalism has been prevalent. The plywood signs have cut the replacements formerly needed in these areas to virtually nothing. And in recent months, now that the program has taken hold in large areas of the city, monthly sign requirements are dropping rapidly.

Manufactured by Traffic Control Signs, Inc., (2909 S. Alaska Way, Tacoma, Wash.) the new signs are made from medium density resin overlaid fir plywood with completely waterproof glue. Paul Lemcke, president of the company, guarantees their durability.

WAREHOUSE of Traffic Control Signs, Inc., Tacoma, Wash., holds wide variety of stop, regulatory and warning sings made from resin overlaid fir plywood with 100 per cent waterproof glue. Overlaid surface, hard and glass-smooth, is ideal base for either enamel or reflectorized finish surfaces.

Depending upon specifications, Lemcke uses ⅜" panels for his blanks which are rounded off at the edges to quicken runoff. Edges are sealed with a highly water-resistant formula developed by him after a long period of investigation and research.

Lemcke says the resin overlaid surface which is permanently fused with the plywood when it is laid up in the hot press is an ideal base for either enamel or reflectorized surfaces and that his signs should have an average life of 8 to 15 years.

Plywood is no newcomer to the sign business. The state of Oregon has used standard grades of Douglas fir plywood with waterproof glue for all state highway signs over 7-13" wide for about 15 years. On the East coast, the state of Connecticut has used plywood for five years and is now producing at the rate of 12,000 signs a year. These signs are manufactured from ½" Douglas fir plywood in the state prison shops.

Section News

Texas

The April issue, being their first, invited suggestions for the name of their newsletter . . . thus far Texas ITEms has been used . . . possible ideas from here include—TexITE News—Meekly Speaking—Institute Scoop—etc., . . . twenty-five of the twenty-six ITE members have paid their $1.00 dues . . . five local section affiliates have been corraled . . . Thomas H. Mac Donald, Honorary Member, ITE, is enrolled as a "working member" for the new section . . . confirmation on personnel changes throughout the past months include . . . Lloyd Braff . . . General Manager, Department of Traffic, Los Angeles, California . . . Win Carsten hopped from Houston to Traffic Engineer, City of Dallas . . . Dick Conley now Traffic Engineer for Beaumont, previously in Houston . . . R. T. Gregory, formerly with Kar-Trol Signal Company, new Assistant TE for the City of Fort Worth . . . May Meeting, Houston, Texas . . . big blast . . . fine turnout.

Midwest ITE-ms

Forty-six people in attendance at April meeting . . . Wayne Volk host at annual trek to Milwaukee-Cubs ball game on May 7 . . . Bureau of Street Traffic in conjunction with the Chicago Police Department completed a study of parking conditions in the Loop . . . the conditions are bad . . . A year's investigation of trucking problems, same place, brought forth a Chicago Council ordinance restricting standing, parking size of vehicles, and use of sidewalk elevators . . . this means trucks over 33 feet in length are barred from Loop unless destined for off-street loading docks . . . engineering studies included distribution of 13,000 questionnaires to all truck drivers entering the area during a typical week day . . . this May issue is 1st Anniversary of their paper . . . no question about its popularity and value —Hats Off . . .

Western ITE

May 12, 13, 14 were dates of the 7th Annual Meeting held in Corvallis, Oregon . . . Los Angeles area held an April meeting with George D. Roberts speaking on the Monorail System of mass transportation . . . Martin Bouman, new Associate Traffic Engineer in Jim Reading's San Diego Office . . . 25 national ITE-ers who are not section members yet . . . Francis Burton, new TE in Albuquerque, New Mexico . . . Automatic Signal's Wandering Ambassador disappointed in Denver Street Lighting program . . . S. De Young, by initials, had his vehicle looted while parked directly under a 15,000 lumen mercury vapor light in Downtown Denver . . . Colorado now using radar speed enforcement . . . Bob Dier's Long Beach "scramble" intersections are so successful that the City Council has authorized two new locations . . . Bob using a 9 second walk with a 12 second clearance out of a 60 second cycle . . . this was reported by CC Robinson in their April issue.

JOBS AVAILABLE

CITY OF LOS ANGELES
CALIFORNIA

Examinations for the following positions in the City of Los Angeles will be given in the near future. Final application date is July 13, 1954.

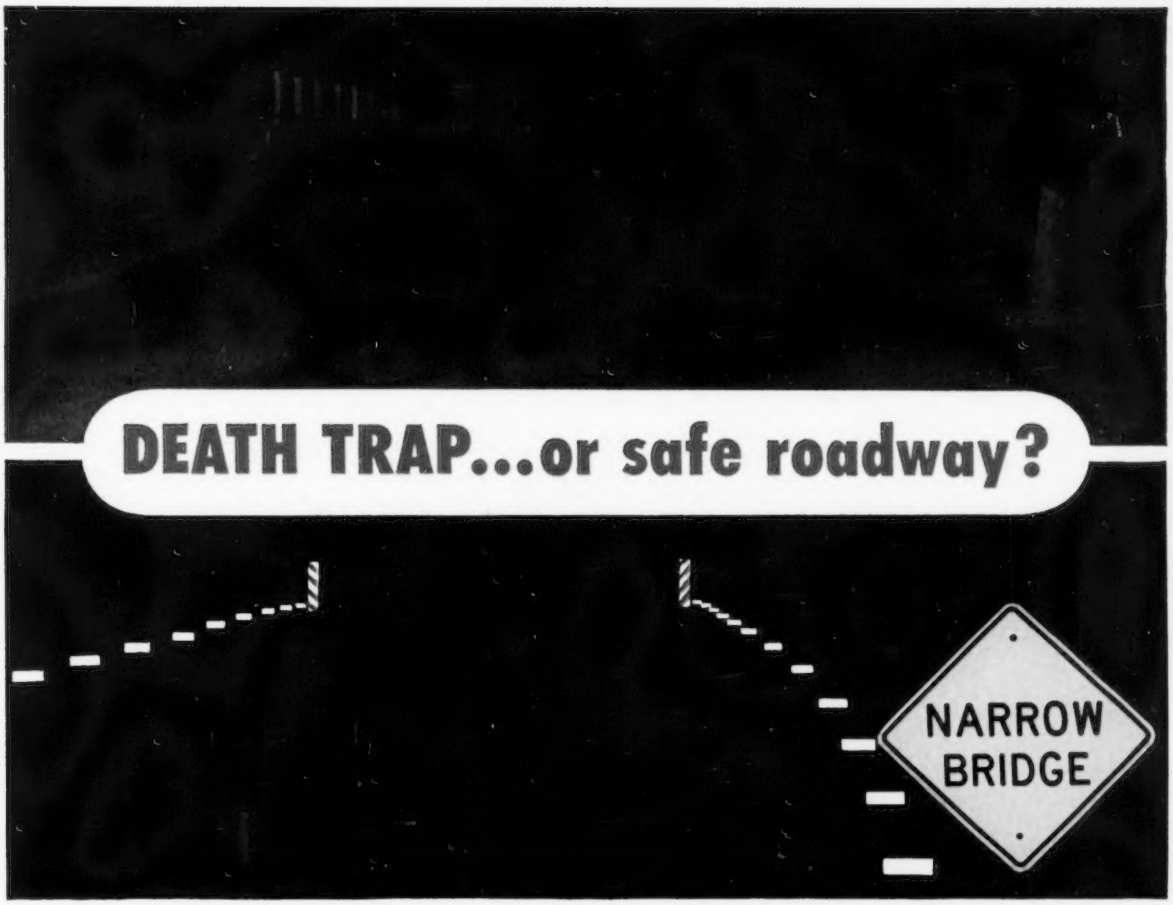
Senior Traffic Engineer — College degree plus 8 years experience.

Traffic Engineer — College degree plus 6 years experience.

Traffic Engineering Associate — College degree plus 3 years experience.

Traffic Engineering Assistant—No minimum requirement.

For further information, apply:
Civil Service Department
City Hall, Room 5
Los Angeles 12, California



$76.90 makes the difference!

A speeding car...a dark night...and the narrow bridge in the top photo can spell sudden death!

How different with the bridge below. This one is clearly marked with a warning sign, delineators and bridge-end markers of "Scotchlite" Reflective Sheeting. As far as half-a-mile away, the "Scotchlite" Sheeting flashes a brilliant warning message to the motorist . . . slows him down . . . then guides him safely across the bridge.

The spectacular red and silver bridge-end marker, like all signs of "Scotchlite" Sheeting, looks the *same at night* as it does by day. Wide-angle Flat-top surface is brilliantly reflective even in heavy rains. Light but sturdy 61S-T6 aluminum backing resists rust and corrosion—ends maintenance problems!

Eliminate narrow bridge death-traps on your roadways. Order this life-saving package today:

4 36″x8″ Bridge-end markers @ $6.80	**$27.20**
2 24″x24″ Narrow Bridge signs @ $10.80	**21.60**
2 packages 2″x10″ Delineators (25 per pack.) @ $14.05	**28.10**
	$76.90

Order from your traffic sign supplier or write to the address below.

REG. U.S. PAT. OFF.

SCOTCHLITE

BRAND

REFLECTIVE SHEETING

The term "Scotchlite" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ontario, Canada.

Letter to the Editor

Sir:

The first traffic-actuated signal was designed and constructed by me, and installed by the Maryland & Pennsylvania Railroad at the intersection of its tracks with Glenarm Road at Glenarm, Maryland on February 25, 1921.

This signal normally displayed 'stop' to the railroad in the absence of vehicles on the railroad; but an approaching vehicle on the railroad automatically actuated the signal and caused it to display 'stop' to the highway 20 seconds before the railroad vehicle reached the crossing. After this vehicle passed by the crossing, the signal automatically reverted to its normal position. *One of the vehicles on the railroad which caused complete actuation of the signal in 1921 was an automobile.*

This automobile was a standard Hupmobile touring car with steel flanged wheels so that it would run on the track. It frequently passed over the Glenarm crossing on its inspection trips; and it carried as its passengers Mr. O. H. Nance, Mr. M. E. Sebree, and Mr. John Livingstone. This automobile remained in service until 1926, when it was replaced by a Rickenbacker auto. The Rickenbacker car was replaced by a Buick several years later.

This first traffic actuated signal was described and illustrated shortly after it was invented, in the December 1920 issue of the magazine *The Railway Signal Engineer*. The illustrations of this article show the signal in the 'stop' position, and then in the 'clear' position. The signal was also described and illustrated in The Baltimore *American* of October 15, 1920 and in the *Railway Age* prior to its installation at Glenarm. It was also illustrated and completely described in *Popular Mechanics* on March 15, 1921, on page 598.

And of course, one must not forget the famous horn operated traffic signal which was affixed at the intersection of Falls Road and Belvedere Avenue, Baltimore, Maryland, designed and constructed by the writer, and placed in successful daily public use on February 22, 1928, by the Baltimore Police Department.

Complete stories with illustrations of this installation were printed in the February 22, 1928 issues of *The Baltimore News* and *The Evening Sun*. The heading of *The Evening Sun* article was "Tests 'Microphone' Traffic Signal. Lurz Pronounces Light with 'Ears' a Success."

And the photograph was captioned, "Where a Toot Changes 'Stop' to 'Go'. The new traffic control device, whereby the 'go' signal burns steadily on the main thoroughfare to be changed to permit cross traffic only when a horn is blown near its microphone is shown in the picture. The device, invented by Charles Adler, a Baltimorean, is being operated at Belvedere Avenue and Falls Road."

CHARLES ADLER, JR.
Signal Engineer, Maryland & Pennsylvania RR—Baltimore. Affiliate Member, Institute of Traffic Engineers. Member, Maryland Traffic Safety Commission.

Shopping Center

For detailed information and prices at no obligation to you, write directly to the manufacturers or check the desired numbers and mail to: Shopping Center, TRAFFIC ENGINEERING, Strathcona Hall, New Haven 11, Conn.

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67. Give Yourself The Green Light

A new General Motors Film showing progress being made in solving the highway problem, and suggesting further action. "Give Yourself the Green Light" is a 16-millimeter sound motion picture in full color. The running time is 26 minutes. Prints are available on the same basis as other films in the General Motors Film Library. There is no rental charge and the only cost to the user is the return transportation costs. Requests should be addressed to:

GENERAL MOTORS CORPORATION
DEPARTMENT OF PUBLIC RELATIONS—FILM LIBRARY
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DETROIT 2, MICHIGAN

68. Make Yours a Friendly City . . .

Well lighted streets are hospitable! Kerrigan Weldforged Lighting Standards are of heavy duty construction . . . "Factory-Built" to the highest engineering standards . . . They meet all requirements of the I. E. S. street lighting code. The shafts are continuous tapered, octagon in shape . . . They're cold-formed from open-hearth steel . . . strong . . . yet light in weight . . . Kerrigan Standards are designed along modern, practical lines . . . trim, smooth, and neat in appearance . . . write for our catalogue, Kerrigan Weldforged Lighting Standards to:

KERRIGAN IRON WORKS
NASHVILLE, TENNESSEE

69. New Heat Lamp Vacuum Applicator

A 36-inch heat lamp vacuum applicator—used in refurbishing reflectorized signs with "Scotchlite" brand reflective sheeting—has been announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

The unit can be purchased separately, or as the major item in a special introductory offer which includes enough supplies to set up a sign maintenance operation, according to the company. The special offer includes three rolls of reflective sheeting; 40 aluminum blanks; 30 unmounted Stop sign faces; cut-out legends, symbols and border strips made of "Scotchcal" brand film and three letter-spacing templates.

For further information write to:

MINNESOTA MINING & MANUFACTURING COMPANY
900 FAUQUIER STREET
ST. PAUL 6, MINN.

70. Presenting the Porce-Line . . .

Pressed steel, porcelain enameled traffic marker buttons and arrows. Porce-Line gives you long range target visibility, high-gloss reflection, day or night. For ultra visibility, reflectorized with glass spheres. Manufactured of 16-gauge pressed steel deeply embossed and finished with a ground coat and a color coating of porcelain enamel fused to the steel at a temperature of 1700 degrees. For more information on the modern traffic button—Porce-Line, its qualities, and characteristics, write to:

THE PORCE-LINE COMPANY
1515 HICKORY STREET
DALLAS, TEXAS

71. Traffic Signal Cables

For reliable service over many years in vital municipal services PWC cables are made to the IMSA's specifications. Solid bare copper conductors are standard. Primary insulations can be furnished in either polyethelene of polyvinyl chloride employing a partial color-code with one identified leg or pair in each layer or a full color-code of black, white, red, green, orange and blue. The cable core is assembled with water repellent fillers when necessary to make round and bound with a non-smudging and non-contaminating laminated tape. The cable covering is a heavy tough PWC special polyvinyl chloride sheath compound with a temperature range from 140°C to 80°C. For full information on Traffic Control Cables, write:

PLASTIC WIRE AND CABLE CORPORATION
JEWETT CITY, CONNECTICUT

72. Roadside Maintenance Information

Occasionally a paper is written that is of such importance that wide distribution is warranted. The paper, Chemical Control of Roadside Vegetation, is just such a paper. The program outlined in this report has its purpose to propose efficient, less expensive, safe maintenance of highway roadsides. This means elimination of brush, weeds, ragweed, and posion ivy along your highways, and unlike many other usual purchases, this improved program will reduce the cost per mile of road. For copies of the above mentioned report, or for further information regarding the program or the use of Dow herbicides, and chemicals, write:

DOW CHEMICAL COMPANY
30 ROCKEFELLER PLAZA
NEW YORK 20, NEW YORK

73. Catalog of Driver Training and Testing Equipment

By the time you would take to read this catalogue (fifteen minutes) there will have been 200 motor vehicles accidents . . . one person will have been killed . . . thirty-seven persons will have been injured. The Porto-Clinic is a Driver Testing and Training Unit. Included in it are testing devices for measuring visual acuity, field of vision, color perception, reaction time, depth perception and others. Other products of the Porto-Clinic Instruments Company are described in this catalogue. These include the New Saf-T-Rater, the Fuller Traffic Slide Rule, the Magno Saf-t Board and many others, all designed to improve your safety program. For your catalogue of Driver Training and Testing Equipment and descriptions of Visual Aids for Safety, write to:

PORTO-CLINIC INSTRUMENTS, Inc.
298 BROADWAY
NEW YORK 7, NEW YORK

74. New Locking Device Assures Stability

A new locking device called Speed-E-Lok, installed by Eastern Metal of Elmira, N. Y. on its "A" Stand signs has eliminated a major problem in portable road warning signs. Heavy winds and the air backwash from passing trucks have, in the past, lifted portable signs off their supports causing the stand to collapse shut and fall to the ground. A feature of the Eastern Metal "A" Stands has been the "free swinging sign" which has helped prevent the stand from being blown over. This old feature, coupled with the new Speed-E-Lok Locking Device makes the Eastern Metal "A" Stand literally windproof, enabling it to "stand up" under the most extreme wind and weather conditions, air backwash or accidental bumping.

This new Speed-E-Lok device consists of a rust-proof cadmiumplated lockpin rod located in the top corner of the "A" Stand to and through the offset hole in the permanent side frame. This Lockpin slips behind movable support when the base of the stand is opened. There are no mechanical parts and the simplicity, yet effectiveness of this device assures dependability.

Complete information in colorful illustrated folders and price lists on Eastern Metal's "A" Stands, Traffic Signs, Utility, Industrial and Safety Signs are available on request to:

EASTERN METAL OF ELMIRA, INC.
38 HARRISON STREET
ELMIRA HEIGHTS, NEW YORK

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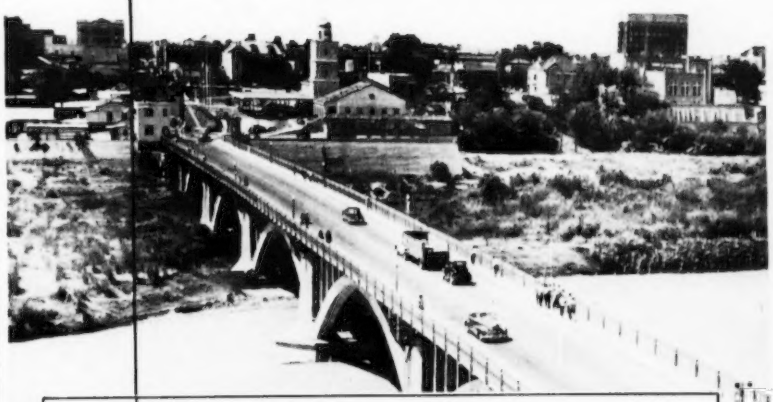

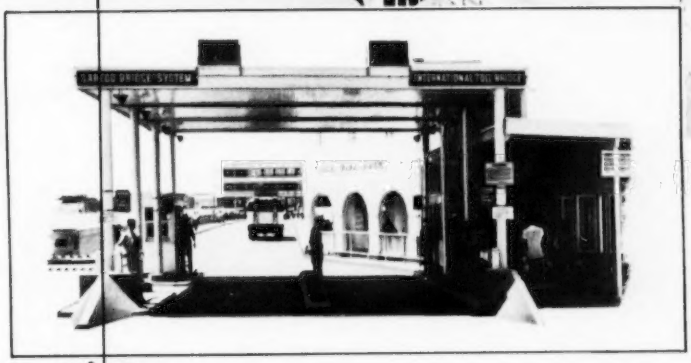

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From Mexico to Canada, from Atlantic to Pacific, Taller & Cooper toll installations provide swift, reliable control of traffic and revenue. Every major toll facility in the United States depends on Taller & Cooper Collection Equipment for accuracy, dependability, and speed of collection. T & C all-steel, weather-proof, Booths and Canopies, can be installed on the site in a matter of hours. They are designed to meet the specific needs of each installation, assuring every working convenience and protection.

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Technical Council Activities

Discussion of Recent Publications of Methods of Collecting O-D Data and the Analysis of Accuracy
Report of the Committee on the Development of Traffic Study Techniques

The following report is the work of Committee 3-P. W. H. Carsten, Chairman; R. G. Bates; J. S. Burch; W. W. Dibble; M. E. Campbell; W. R. McGrath; W. J. Miller, Jr.; O. K. Norman; C. A. Rothrock; H. S. Levinson; J. K. Mladinov.—EDITOR.

Comparison of Two Methods of Internal Origin-Destination Surveys. By James H. Kell, Bulletin No. 118. Vol. XXXII, No. 1, January, 1953, Purdue Engineering Experiment Station.

Comparison of the home-interview survey to the controlled post-card survey presents some variations in analysis but does not state specifically whether one method of internal survey is more accurate than the other. It was found that the post-card method over-reports trips and the home-interview method under-reports trips, based on screenline comparisons. However, the screenline check was stated as being an imperfect means of checking survey completeness. Both methods of surveys have been used successfully in the past and both have produced adequate data for traffic planning. Since it is not known which survey is the more accurate, a study should be made to compare the *daily variations* of movements between O-D cells. Then a more valuable comparison of the different survey methods would be possible than that based on screen lines.

The Post Card Method of Obtaining the Origin and Destination of Traffic at Ames, Iowa, and its Comparison with Roadside Interview Method. By Robley Winfrey, Presented at the Highway Research Board Meetings, January, 1953.

This comparison was made between the roadside post-card survey and the roadside interview survey with a time lag of two weeks between each survey. Zone to zone movements of the roadside post-card survey compared to 100% sample of roadside interviews gave a wide variation of results. A smaller percentage return of cards was received from the drivers of trucks than from drivers of passenger cars. Likewise, the locally owned and operated vehicles produced a higher percentage return than did the vehicles bearing out-of-county plates. There is a smooth range of expansion factors roughly 1.3 to 8.0 for the post cards returned for particular zone to zone movements to bring those returns up to the same number of trips found from roadside interviews at the same stations for the 16-hour period, 7 a.m. to 11 p.m. There seems to be no specific relation between the expansion factor and the geographical location of the pairs of zone to zone movements, other than the factor is generally lower when one termini is interior to the station than when both termini are exterior. Trips from one state across Iowa to another state resulted in higher expansion factors than did trips of shorter length.

Here again it was assumed that a 100% roadside interview sample for one day reflected a true picture of average travel habits. The method of comparison was good, but to make definite and reliable comparisons of two survey methods, the *daily variation* of zone to zone movements must be known. The 100% roadside interview samples should be taken on two or more days at the same location.

Sampling Methods for Roadside Interviews. By Irwin Miller and P. E. Irick, presented at the Highway Research Board Meetings, January, 1953; and

Sampling Procedure for Roadside Interviews in Origin and Destination of Traffic Surveys. By Robley Winfrey and Robert J. Hansen.

Presented at the Highway Research Board Meetings, January, 1953.

From the two papers it is evident that the use of a sampling process of roadside interviews is both practical and beneficial. The sampling procedures promote efficient operation of the interviewing station by minimizing confusion, reducing the number of interviews to be coded, and which, in turn, reduces the length of time required for completion of the project. Both papers appear to have adopted similar methods of random sampling procedures; they are samples controlled by time, volume, or a combination of time and volume.

It was concluded that on the average, for the large number of estimates involved in any one survey, the theory of random sampling will satisfactorily explain the errors which arise from the various sampling methods proposed. The results given make it possible to predict the average errors and probability limits for those errors when a particular amount and type of sampling has been done. Conversely, one can determine the amount of sampling necessary to keep the sampling errors within specified probability limits. A study required to determine the specified probability limits will be discussed later in this report.

It is felt that the two papers have produced useful results on the theory of sampling roadside interviews. Continued work in this phase will ultimately place sampling of roadside interviews on the same acceptable level of accuracy as post-card and home-interview *O-D* surveys.

A Modified O and D Survey. By Robert D. Dier, Traffic Quarterly, April, 1953.

A comparatively new method of O-D surveys was initiated incorporating methods of license plate surveys; sampling peak and off-peak hour movements, and using only inbound data. This technique was chosen since time was the primary factor involved as construction dates had already been set on facilities governing new locations of bridges connecting onto a proposed freeway. The survey itself consisted of placing tissues under the windshield wipers of cars at a diversion zone where the drivers had a choice of using existing arteries or the new freeway leading to the central business district. A cordon about the central business district was established for identifying the location of the entering vehicles.

This method was not offered as a substitute for a more comprehensive and accurate interview method of origin and destination study, but was the only method at hand to solve one major traffic problem in the shortest time possible.

Recent Publications of Traffic Assignment and Analysis

Traffic Assignment, Highway Research Board, Bulletin No. 61, 1952.

Initial efforts to place traffic assignment on a scientific foundation are presented in Bulletin 61. The papers represent the findings of several researches into comparative traffic usage of highway facilities of different degrees of attractiveness, and shows further need for continued pursuit of additional information of this type. The long tedious task of route analysis and trip assignment remains until the development of a technique to speed up this procedure has been perfected.

Recommended O-D Study

It would be the purpose of this study to compare daily variations of zone to zone movements obtained from one specific O-D survey method to provide estimates of allowable errors for the respective sizes of said zone to zone movements. The roadside interview method would serve best for acquiring the day to day variations. Two papers heretofore discussed, i.e., Comparison of Two Methods of Internal Origin-Destination Surveys and the Post Card Method of Obtaining the Origin and Destination of Traffic at Ames, Iowa and its Comparison With the Roadside Interview Method, found differences existing in zone to zone movements with little concluding evidence concerning the most reliable method of survey. In the papers on sampling of roadside interviews, sampling techniques were devised which produced useful results and where one can determine the amount of sampling necessary to keep the sampling errors within specified probability limits or allowable per cent errors. In the determination of the size sample, however, specified probability limits have not as yet been established.

Probability limits are directly related to the daily variations of zone to zone movements, therefore when daily zone to zone trip variations are known, probability limits can be established as equal to or an amount greater than the daily per cent variations. For example, when an average zone to zone movement of 100 trips has a 10 per cent daily variation, the probability limit for 100 trips could be assumed 10 per cent. The known daily variations of zone to zone movements will limit the minimum usable size and provide a basis for consolidating groups of smaller movements to insure a specified degree of accuracy.

In conclusion it is pointed out that the need for the recommended O & D study has evolved from the many O-D surveys that have been conducted; the comparisons that have been made as to the reliability of O-D survey methods; and research completed on roadside interview sampling which have left many unknowns to be solved.

THE ENGINEER'S RELATION TO HIGHWAY TRANSPORTATION

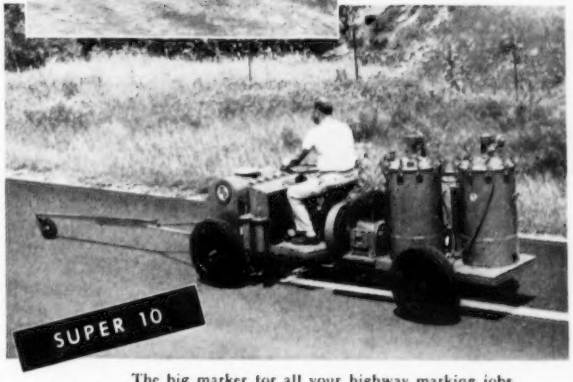
by THOMAS H. MACDONALD
(Honorary Member, ITE)

Mr. MacDonald presented this paper at the Sixth Salzberg Memorial Lecture held at Syracuse University, Syracuse, New York, on April 28, 1954. Next month in Traffic Engineering there will appear an article prepared from Mr. MacDonald's lecture.

ANSWERS TO QUIZ ON PAGE 343
7, 19, 20, 17, 18, 16, 15, 14, 13, 9, 12, 5, 11, 8, 3, 6, 4, 10, 1, 2.

Here's a low-priced line striper for regular or reflective painting that offers more exclusive features than any other marker in its class. Gives you built-in riding trailer with foot and parking brake; easy steering in circles, curves or straight line; capable of painting solid or intermittent line; the M-B Jet Tube assures sharp lines and the spray gun can be mounted outside of wheel tread for close work. Has 18 gallon capacity, 6 HP engine with travel speeds of 3 to 5 mph. Transport trailer and all special accessories available.

One-man operated all-around utility marker. Self propelled and has 18 to 36-gallon capacity. (One or two colors). Lays double solid lines 3" to 6" wide; intermittent attachment available. Bead dispenser available for reflectorizing. Has two speeds forward and one reverse. Special, tilt bed general utility trailer available for long hauls.



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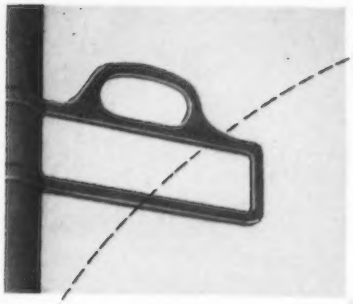

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When? . . . September 27-30, because . . .

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Compiled by
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Yale Bureau of Highway Traffic

The publications herewith listed are not available for distribution by the Bureau or the Institute. Inquiries should be directed to the agency listed as publishing the material.

Alexandria, Virginia.

A Parking and Traffic Survey for Alexandria, Virginia. The City Corporation. 1952. 90 pp. Prepared by Marshall B. McReynolds and John T. Hanna.

The survey, completed on August 16, 1952, contains traffic safety, parking, traffic control and administrative programs.

American Association of State Highway Officials.

Road User Benefit Analyses for Highway Improvement Part I — Passenger Cars in Rural areas; a report by the Committee on Planning and Design Policies. The Association, 917 National Press Building, Washington 4, D. C. 1952. 137 pp.

This brochure presents a method for making simple and practical analyses for highway improvements based on benefits to road users. The preferable alternate in location or design of a single improvement can be determined by such analyses and applies only for alternates of location and design of the same general highway facility.

Arizona. Highway Department. Division of Economics and Statistics.

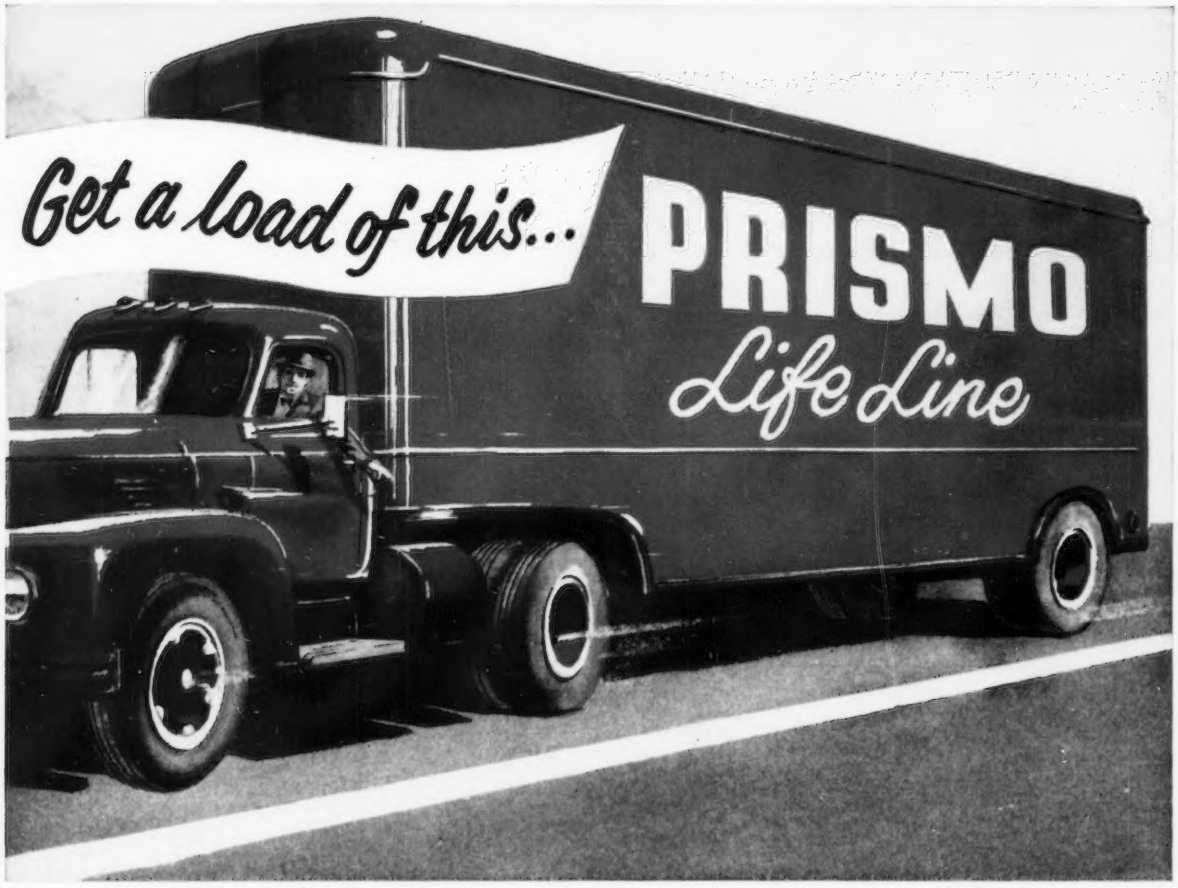
Traffic Classification Study on Arizona State Highway System. The Department. 1953. 22 pp.

Presented in this report are summaries of traffic data obtained from 24-hour manual classification counts made for each day of the week at six widely distributed rural locations on the State Highway System.

California. Public Utilities Commission. Transportation Department, Construction, Maintenance and Service Division.

Statewide Grade Crossing Survey Progress As of January 1, 1952. The Commission, 1952. Variously paged.

The purpose of this study was to ascertain needed improvements at the various crossings which, when made, would improve conditions generally and reduce the potential hazards.



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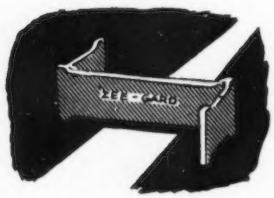

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